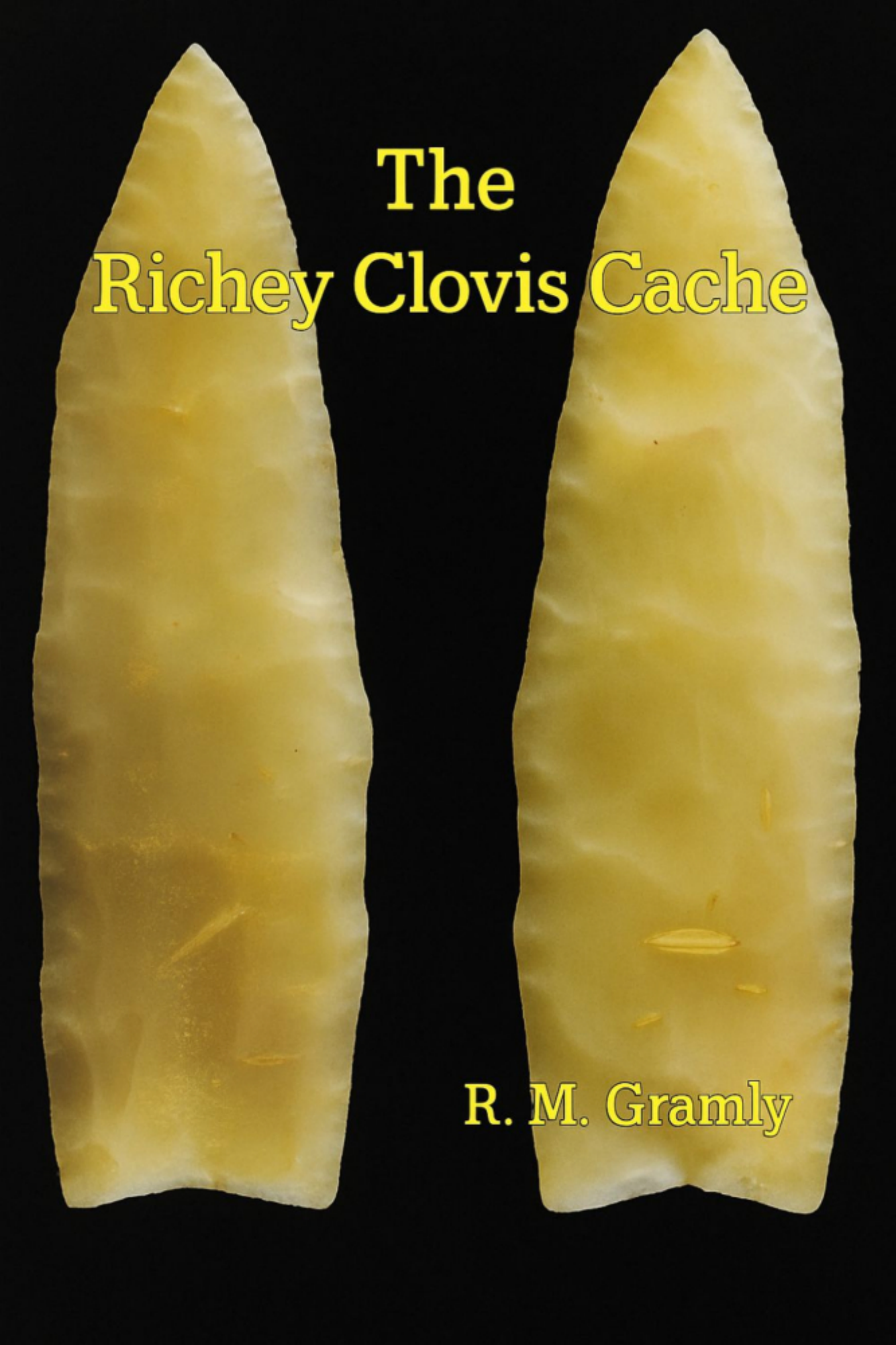
The
Richey Clovis Cache
R. M. Gramly

Cover illustration. Largest Clovis point in Richey Clovis Cache. It shows extensive resharpening because of use and has patches of ancient blood residue. Photo by Pete Bostrom, Lithic Casting Lab. See page 27.

Sidescraper (yellow jasper), fluted adze (translucent tan and red-brown agate) and decorated bi-beveled rod (mastodont or mammoth limb bone) – all from the Richey Clovis Cache, East Wenatchee Clovis site, Douglas Co., Washington. Photo by Pete Bostrom, Lithic Casting Lab.

THE RICHEY CLOVIS CACHE:
Earliest Americans Along the Columbia River

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Buffalo, New York 14203

Persimmon Press Monographs in Archaeology, 1993

To James Fell, who watched my back.

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The wholehearted cooperation of site owners, Mack and Susan Richey, made the fieldwork and educational program a success. I deeply appreciated their good humor under difficult circumstances, and their perserverance made the gift of scientific knowledge possible.

Grants in support of the excavation and laboratory analyses by EARTHWATCH, The American Philosophical Society, the Archaeological Society of Ohio, and Mr. John McKendry of Buffalo, New York were gratefully received. Salaried time, transportation and certain organizational expenses were underwritten by the Buffalo Museum of Science, where I served as Curator.

The labor of more than 100 volunteers was critical to the smooth flow of fieldwork. A core team of excavators (James Fell, Mignon Johnson, Betty Knop, Dick and Joyce Sojka, and Bill Pickard) organized and directed all activities at the site and in the laboratory of the North Central Washington Museum. Dave and Val Waldorf, Mark Clark and Brett Lenz spearheaded task groups, and their comradeship was much appreciated.

The roster of volunteers, some of whom made journeys of thousands of miles to be with us at Wenatchee, is long. Many are dear friends, and I was proud of their support and faith in the project. They are: Dee Aiani, Marian Banks, Bax Barton, Elizabeth Beringer, Rosie Bull, Jim Burns, Larry DeForest, Marilyn Dillsi, Morris Dyer, John Dyck, John E. Gahringer, Marianne Gordon, Barbara and Hugh Havercamp, Leah Hawley, Sue Heller, Jack Holland, Chris Lamb, Sarah Manke, the Millmans (Melinda, David and Austin), Ann and Gary Moller, Cal Ohme, Tom Pascoe, Peggy Paull, Betty and Tom Pearson, Jordan Perrine, Marjorie Persinger, Bob Phillips, Cam Pierce, Saul Renderfrance, Ione Rice, Don Sivula, Sally Strazdins, Ken Wallace, Darlene Warren, Joan Wilkes, Judy Wright, and Norm Wright. Also of help were: Harry Oda (flintknapper), W. and C. Fowler (mineralogists), Dan Wheat (reporter), Joan Patterson (Douglas County Commissioner), Robert Spratt (District Operation Engineer, Washington State Department of Transportation), Jean and Ray Auel, Dave Rea (reporter), J. Gready, Patricia Clark, Cole Hurst, Robert Mierendorf (lecturer), and Mike Vogel (reporter).

In the midst of political turmoil and confrontation I sought the advice and counsel of Dr. Peter Storck (Royal Ontario Museum), Greg Perino, Dr. Arthur Roberts (Simon Fraser University), and Dr. Vance Haynes (University of Arizona).

The Clovis Project was a cooperative venture of the Buffalo Museum of Science and the North Central Washington Museum, Wenatchee. Dr. Keith Williams and his motivated, creative staff of the NCWM organized a memorable educational program for many thousands of the public. I shall long remember the early evening lectures we gave to tour groups who visited the archaeological site under the auspices of the NCWM, our spirited conversations in the gloam and the thrill of sharing something so old, so important.

Last, I wish to acknowledge the hospitality and creative dialogue of leaders of the Yakima Nation and also the understanding words of two members of the Colville Confederated Tribes who stood with me on the day of demonstration at the archaeological site (October 22, 1990). No hollow rhetoric theirs.

PREFACE

This small work is provided to the community of amateur and professional archaeologists who require something better than heresay about discoveries that were made at the East Wenatchee Clovis site, Douglas County, Washington, in 1987, 1988 and 1990. The Richey Clovis Cache is but one feature at this presumed Clovis encampment whose areal extent has not been established. A moratorium on fieldwork, which was instituted in 1992 and set to run for 15 years, has altered the normal course of events for this site with unpredictable outcomes.

This work is not a site report. Rather, it is an inventory of artifacts and where they were found. Many scientific tests that will help us understand the contexts of these objects and their uses will require years to perform. In the meanwhile the quest for knowledge about the initial peopling of the New World continues, and the Richey Clovis Cache has a few insights to offer seekers.

So little excavating has been done at the East Wenatchee site, however, that ideas about stratigraphy, antiquity and the very nature of the occupation must remain provisional. This unsatisfactory, uncertain state of knowledge will, I know, be unwelcome by most scholars.

I look to Dr. Richard Waitt, consulting geologist for the East Wenatchee project, to share his understanding about the sedimentary history of this locality in other avenues of publication. We hope that Richard will also investigate sources of the colorful agates, which were employed by the Clovis tool-makers of central Washington. Important discoveries may be in the offing.

Most of the inked illustrations of stone tools were drawn by Valerie Waldorf, who is familiar with stoneknapping and a careful observer. Valerie and Joe Mortellaro, who captured the 12 bi-beveled bone rods on paper, are accomplished artists. This work has benefitted greatly from their labor.

THE RICHEY CLOVIS CACHE

For decades archaeologists and collectors have scoured the shore and islands of Washington's Columbia River for agate and obsidian arrowheads and other vestiges of prehistoric populations. Their search has been confined primarily to a deep trench that the river has cut through basaltic rocks of the Columbia Plateau (Allen *et al.* 1986). Today, as in the past, human population of this semi-arid region is concentrated along the river, which provides water for irrigation, cheap hydro-electric power, salmon fishing and recreational boating (Alwin 1984). The river is eastern Washington's economic lifeline; its history and present condition are matters of concern.

So much has been written about the Columbia River valley that many might wonder if there were anything left to discover. Yet, in 1987 beneath the surface of an apple orchard high above the river was found one of the most important deposits of ancient artifacts known to archaeological science. A cache of stone and bone implements of distinctive types that date to the waning years of the last continental glaciation was partially disinterred by orchard workers. They found 30 implements about 50 cm below surface while using a ditching machine to lay irrigation pipe (Mehringer 1989; Mehringer and Morgan 1988).

At first the antiquity and significance of their find, since named the Richey Clovis Cache after the orchard's owners, were unrecognized. Word of the discovery eventually reached amateur and professional archaeologists, and in 1988 a team of scientists from Washington State University arrived at the site and conducted brief exploratory investigations. This fieldwork, which was witnessed by hundreds of visitors and media representatives, revealed a trove of superbly crafted flaked stone tools and shaped sections of extinct animal limb bone still in positions where they had lain for perhaps 11,200 years (Mehringer and Foit 1990). The public's imagination was captured not only by the beautiful raw materials that ancient craftsmen had selected for their manufactures but also by the rare opportunity to share the excitement of unearthing tools left by the Earliest Americans.

Initially it was speculated that the implement cache might mark a burial relatable to the Clovis archaeological culture. This culture, which is named for discoveries at the Blackwater Draw site near Clovis, New Mexico, is widely believed to be the earliest phase of settlement in the New World. Clovis hunters preyed upon mammoth, mastodont, giant bison, antelope and other creatures – all now extinct, absent from their former ranges or rare.

Excavations were reopened in October, 1990, by the author and a volunteer team of lay and professional archaeologists, who had come from 12 states and two Canadian provinces. The investigation was under the auspices of the Buffalo Museum of Science, Buffalo, New York, and the North Central Washington Museum, Wenatchee, Washington. Our plan was to lay bare a rectangular group of excavation units centered upon the 1987 find-spot and to dig downward until we reached soil that was barren of cultural remains. Dr. Richard Waitt, geologist with the United States Geological Survey's Cascades Volcano Observatory in Vancouver, Washington, was of the opinion that the Clovis artifacts lay stratigraphically above coarse sand and gravel that had been laid down during one of the monumental floods in the Columbia River valley (Waitt, n.d.). These floods, some of the most spectacular the world has ever known, occurred periodically in the late glacial era and created Washington's famous Channeled Scablands.

Picking up where the 1988 team of excavators had left off, we re-exposed several flaked stone and bone artifacts and expanded the excavation revealing more objects. In the vicinity of the artifacts we dug using wooden spatulas and brushes in order not to injure soft bone or damage the

still-sharp edges of stone tools. Excavators wore disposable plastic gloves when removing artifacts to the laboratory, for we intended to sample tools for ancient blood residues and hoped not to contaminate them.

Each afternoon during our two months of fieldwork we received several hundred visitors. Guided tours of the archaeological site and our laboratory in Wenatchee were organized by the North Central Washington Museum. A newspaper, "Pleistocene Times," was published and handed out to school-age children and adults. We fielded many questions from people who had read about archaeological excavations but had never seen one.

Many of the public were on hand to witness the most revealing discovery for the interpretation of the Richey Clovis Cache, namely, the outline of an ancient pit. It was first detected as an area of slightly darker, relatively loose soil in one of the 1988 excavation profiles. Working slowly with springy bamboo wands we teased the pit fill away from the sides and bottom. Our reward was two flaked stone knives and an uncompleted Clovis-style, stone point (a preform). Also lying on the floor of the oval pit was a peculiar mass of small bone fragments. A massive block of pit fill containing the bone was jacketed with plaster and lifted with a crane for transport back to the Buffalo Museum of Science. When it was dissected several months later and the bone recovered, a knife made from a sharp stone flake was discovered and also several very small flakes that anciently may have blown into the pit as it lay open.

We believe that all the artifacts recovered by orchard workers and amateur archaeologists in 1987 and those unearthed by archaeologists in 1988 had lain in a single shallow pit with dimensions of 1.1 m by 1.5 m. Together with our 1990 finds, this feature (#1) once contained 57 large objects and is properly termed the "Richey Clovis Cache." There were, in addition, several hundred minute stone flakes and bone fragments, most of which were derived from the large implements.

We encountered a second ancient pit (Feature #2) a few meters east of the tool cache in a trench that we had excavated in order to gather soil samples for geological studies. Two large flaked stone artifacts (a sidescraper and an utilized prismatic blade) lay on the bottom and minute flakes of agate and obsidian were scattered among the fill. Although the outline of this feature was invisible to the naked eye, its margins were strikingly evident when soil particle sizes were plotted on graphs.

Neither pit contained human bone nor was there any other evidence to suggest that they had been dug to receive burials. The tools themselves, notwithstanding the extraordinary size and finish of some of them, appear to have been well used. Clearly, they were not just ritual objects.

The mass of stone tools in the Richey Clovis Cache is likely a tool-kit for killing and butchering animals. Any group of Clovis hunters who preyed upon large game would have needed such an assemblage. The assemblage, which weighs about five kilograms, may be divided into several classes according to form, function and stage of manufacture. Most numerous are **Clovis fluted points** (14), which are carefully made, bifacially flaked implements with channels or "flutes" at their base for more secure attachment to handles or shafts. Three of the fluted points served as spearpoints. One was sharply pointed and ready for use; while the others had suffered damage and needed resharpening. In the meanwhile they found use as knives. Next in abundance are ovate or irregularly-shaped **bifacial knives** (8). The function of these implements was fixed by their unusual proportions and shapes; they could not be converted to new forms and their useful lives prolonged. Third in order of abundance are **fluted point preforms** (7). These tools gave good service as knives and would have remained in an uncompleted state until the time when a fresh replacement was needed for a Clovis point. An experienced flintknapper could have transformed any of them into an elegant spearpoint in only 10-15 minutes. The fourth

class of stone tools is **sidescrapers** (4), which may have been used in preparing large hides for clothing, bedding, tent covers and other indispensable articles. Three each were found of **prismatic blades** and **celts** (adzes). Prismatic blades are long, relatively narrow stone flakes that were removed from special cores, usually conical in shape. The specimens in the cache have edges that are dulled by use; when fresh these tools would have been admirable cutting instruments on soft substances like leather and flesh. The celts or adzes are noteworthy finds, heretofore unknown at any Clovis site. One specimen has even been fluted like a Clovis point – perhaps as an aid for hafting. These tools may have been used to work wood, fresh bone, ivory and other hard raw materials. They would also have made good heavy-duty butchering implements for dismembering. The inventory of flaked tools from the pit also includes two delicate **engraving tools** made on thin flakes, two irregularly-shaped **flake knives** and a **blank** weighing 428 grams (about a pound).

The blank is one of the most intriguing artifacts in the Richey Clovis Cache as it is a slab of raw material that was reserved for future manufacture of a tool. Its generalized shape and thickness permit a skilled flintknapper to derive any class of Clovis implement from it. Depending upon the need of the moment, the blank could become a fluted point, bifacial knife, celt or sidescraper. Interesting to note, even this unwieldy object was used for butchering to judge by wear along one edge and the presence of blood residue.

The inventory of flaked tools in the Richey Clovis Cache is unlike what is commonly found at Clovis encampments. Camp sites yield numerous endscrapers for planing and scraping, wedges for splitting, and fragile cutting and engraving tools made from flakes. Hardly ever do excavators encounter large, whole fluted points, preforms for fluted points and implement blanks. When such finds are made, they are explained as accidental losses by hunters.

The utilitarian nature of the tool-kit is supported by blood residue that is present on nearly all tools except on some sidescrapers and prismatic blades. Blood has penetrated microscopic cracks underneath flake-tabs, which resulted from the manufacture and subsequent resharpening of flaked implements (Gramly 1991). Blood is visible to the naked eye as dark reddish-brown, grainy deposits under the flake-tabs. Using the technique known as "cross-over electrophoresis," one of three experimental methods developed for identifying blood residue, and testing against a battery of animal anti-sera, positive reactions were obtained for bison, deer family (caribou, deer, moose and others), and lagomorphs (hares, rabbit and pikas). Human blood was also detected on the largest fluted point in the area where a handle would have been. Although techniques of identifying ancient blood on stone tools are still being perfected and some results are questionable, there is no denying the fact that blood has been preserved on the Richey tools. Hundreds of potential sampling sites promise to be a rich vein of information to serologists and archaeologists in the future.

Other Clovis tool-kits have yet to be tested for blood residues. Finds of large, spectacular tools have been made in Montana (Anzick site), Idaho (Simon site), Colorado (Drake site) and New York (Lamb site). Unfortunately each of these occurrences has suffered disturbance by heavy machinery and artifacts have been mishandled. Only at the Richey Clovis Cache was it possible to collect ancient implements under controlled conditions for the benefit of laboratory researchers.

Among all discoveries of large groups of fresh Clovis artifacts that are known to science, only the Richey Cache and the Anzick site have yielded well-preserved bone implements. Thirteen bone rods lay within the primary feature at East Wenatchee; a fourteenth appears to have been devoured by a scavenger who entered the pit. The gnawed and excreted fragments of this artifact were unearthed in the soil block that was transported to the Buffalo Museum of Science.

Judging by tooth pit-marks and scratches on several of the rods, the scavenger was a wolverine. Wolverines are notorious robbers of caches in the Arctic.

The Richey bone implements are rods of dense, hind leg-bone of mammoth or mastodont. Their average length is 25 cm. Both ends were carefully beveled by grinding, and the flat faces of these bevels have been roughened by scratching – perhaps for secure hafting. Two of the rods bear lines of incisions. These simple ladder- and zipper-like designs are reminiscent of patterns on bone tools of northern Europe's Magelmosian culture (Schuster and Carpenter 1988: 774-90). The Magelmosian and Clovis cultures were contemporaries, and possibly artists in both regions shared ideas even though they were separated by thousands of kilometers. Decorated Clovis artifacts are exceedingly rare and until now were known only from derived, secondary contexts (Haynes 1982). The importance of the specimens from the primary feature at the Richey Clovis site to New World culture history is inestimable.

The function of the bi-beveled bone rods can only be guessed. No clue is afforded by their positions within the cache pit as disturbances by scavengers and trench-digging in the orchard were too severe. It is notable, however, that the rods are paired by size. Depending upon how one chooses to look at it, there are either seven pairs of rods or two sets of seven. Fitted together at their beveled ends and bound with sinew, a set of seven rods would have measured approximately 1.4 m. It is remarkable that the length of the pit in which they were found is 1.5 m. I do not believe that this correspondence is coincidental.

Of the many ideas that have been advanced for the function of the arrays of bone rods I prefer the "sled shoe hypothesis." It best explains how the cache pit remained open and accessible to wolverines. These scavengers had space enough to rummage among the tool-kit, dragging implements this way and that. They may have made the pit a den, to judge by the excreted bone fragments.

Until recently many people of the high arctic constructed small wooden sleds for hauling personal possessions and game. These sleds were 1-1/2 to 2 m in length and about as high as a person's knees. When loaded, such a conveyance could be pulled by an individual or dogs. In order to protect precious wooden runners from abrasion, sections of animal rib or carved ivory "shoes" were attached to the underside of both runners. I hypothesize that the beveled rods of the Richey Clovis Cache functioned similarly. Certainly a small sled could have been accommodated in the pit, and the space between it and the floor and walls of the feature could have been packed full of hunting equipment.

In a treeless landscape devoid of natural materials constructing a cache posed a dilemma. Digging a pit, partially roofing it with a sled, and then banking it with loose earth was an ingenious solution. However, such a chamber was not proof against determined scavengers and provided only temporary storage, at best.

The existence of the Richey Cache implies that hunters abandoned the East Wenatchee site but expected to return in the near future, perhaps after a season. The second cache pit, which was discovered during the 1990 excavation, suggests that Clovis hunters may have routinely visited this encampment in the Columbia River valley. While they were away, they may have sought a supply of agate and carnelian for new flaked tools at outcrops 50 km to the east or perhaps they fished along the river. The bison blood on their butchering tools indicates that during some period of their annual round the Clovis group waylaid these formidable creatures. Perhaps a fall-winter hunt, when animals were well larded and in their prime took place near the Richey site. Not surprisingly, the Clovis camp faces one of the easy routes for reaching the top of the Columbia Plateau. Animals ascending or descending the slope may have been ambushed by waiting hunters.

Mute confirmation of our hypothesis that Clovis hunters waylaid animals moving between the high plateau and the deeply entrenched river valley is provided by the witnessed find of a Clovis fluted knife on the plateau. This enormous specimen, which was fashioned of "green-sheen obsidian" from an outcrop within the Great Basin (perhaps in Oregon), is the largest example of its type known to science. The shape of its basal hafting area is identical to large fluted knives in the Richey Clovis Cache. The find-spot of the obsidian knife lies in a wheat field a short distance from a spring (Brett Lenz, personal communication).

Why the Clovis group who exploited the animal resources of this stretch of the Columbia River valley never reclaimed their remarkable tool-kit is a question that may forever be asked. Perhaps one of the disastrous floods, which periodically swept the Columbia valley in early post-glacial times, or some other natural calamity claimed them as victims? We must believe that in ancient times when the New World was first settled life was not without hazards from unexpected quarters.

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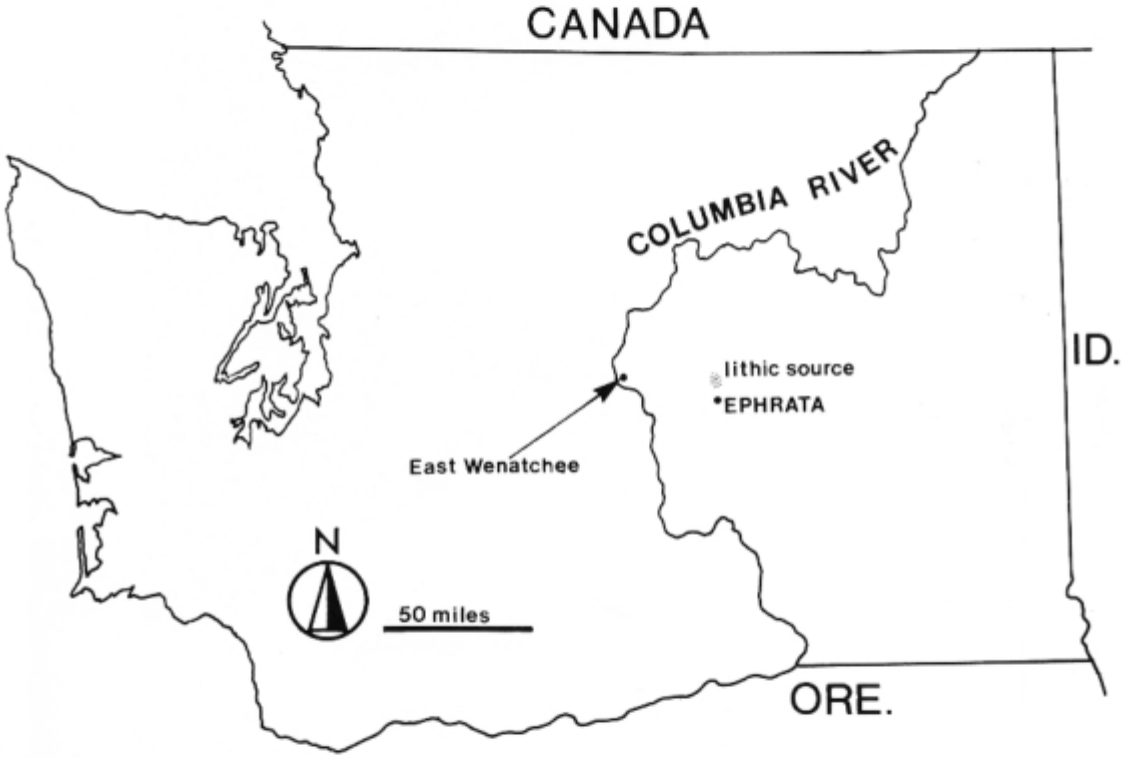
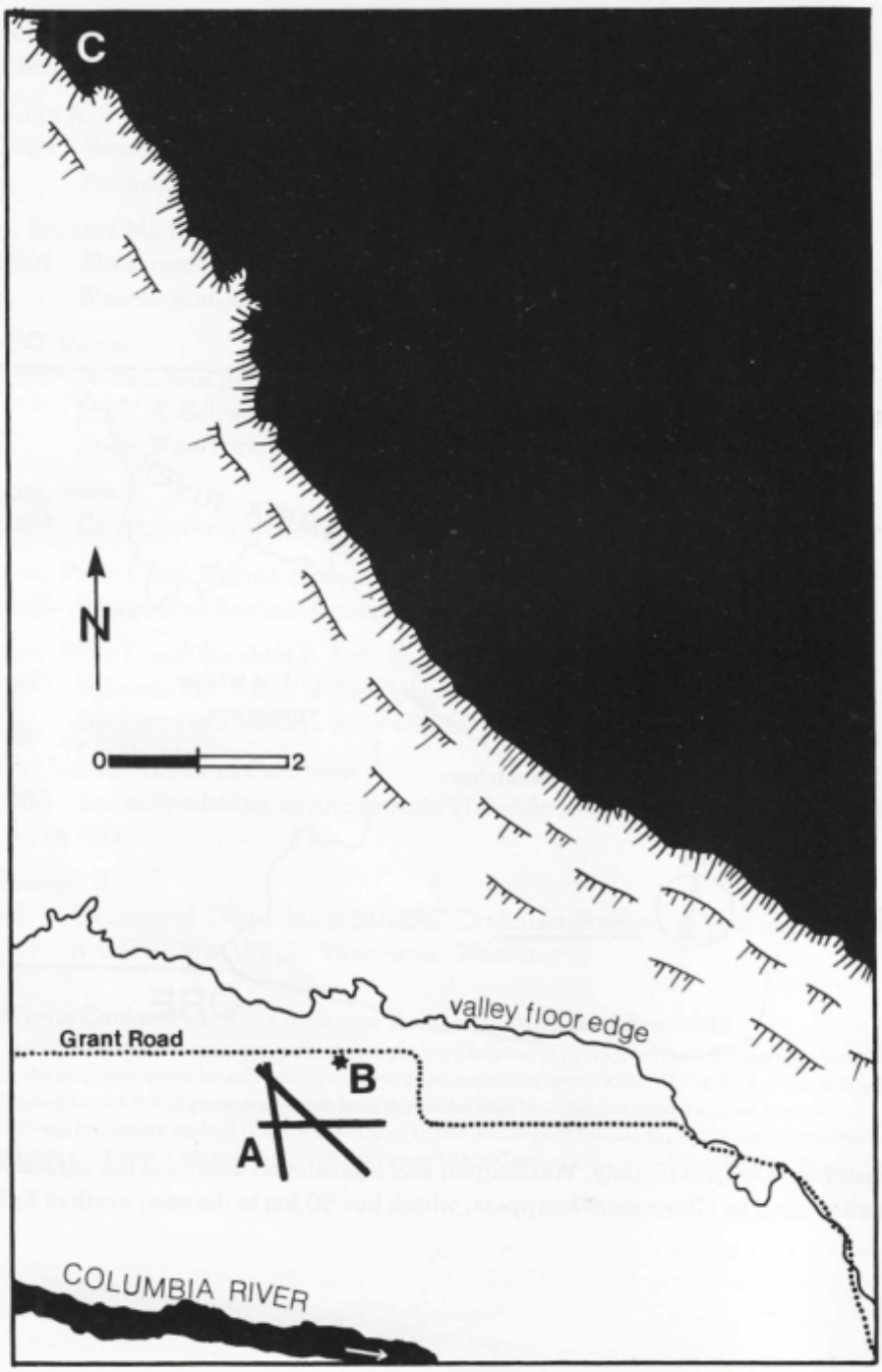
Richey Clovis Cache: Teaching Aids and Reference Materials Available

A set of 80 captioned color slides and accompanying narrative (8 pp.) showing all the major artifacts from the East Wenatchee site may be ordered from Persimmon Press. Also, an attractive wall chart (23" x 35") on linen-finish, acid-free stock portraying the 14 fluted projectile points from the cache may be obtained from the same source.

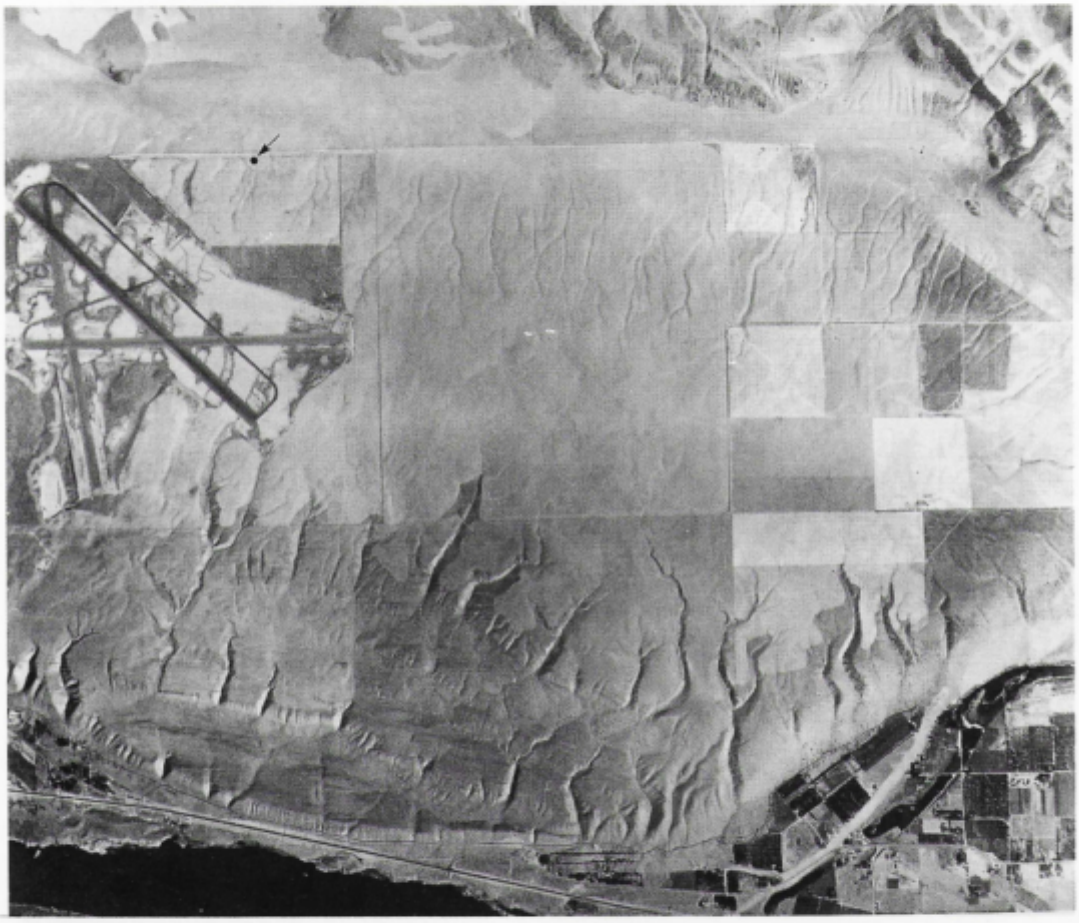
High-quality, epoxy casts of three of the largest fluted points from the cache, two of the bi-beveled bone rods, a sidescraper and the fluted adze may be purchased from Lithic Casting Lab, 577 Troy-O'Fallon Road, Troy, Illinois 62294.



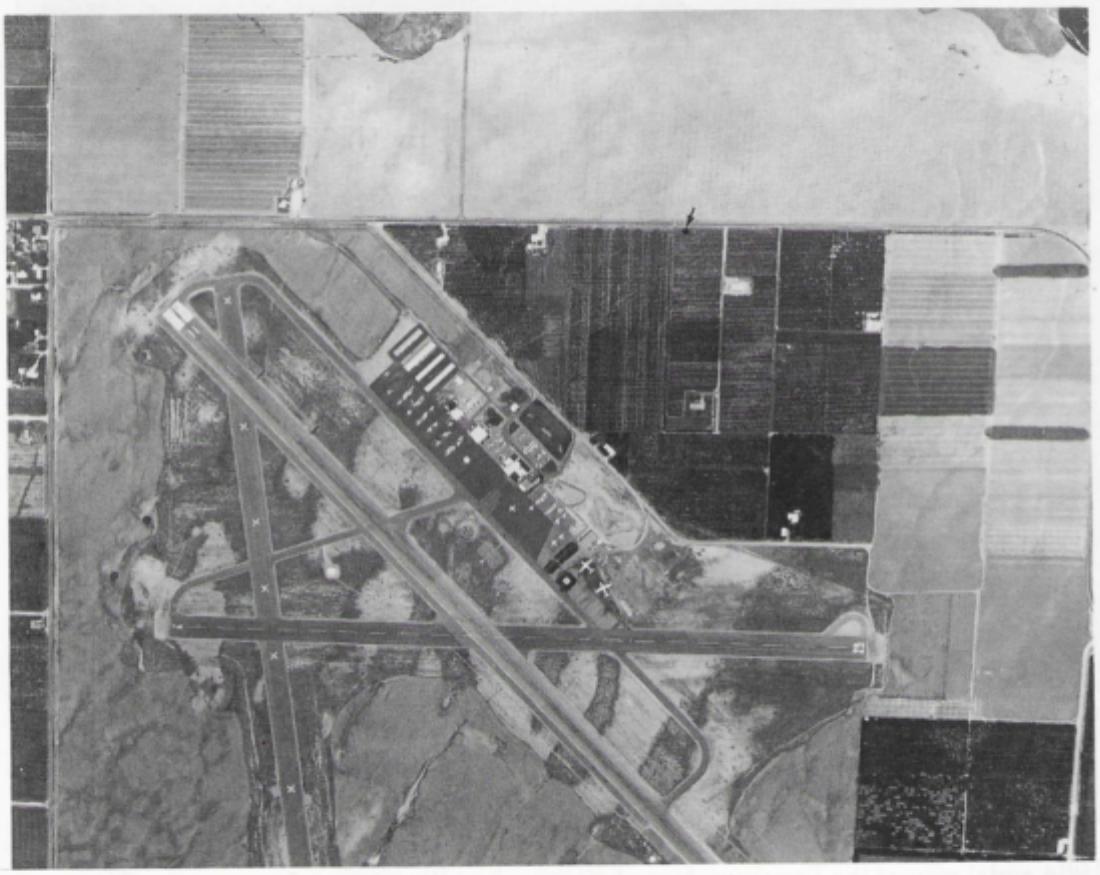
East Wenatchee, Douglas County, Washington and a presumed source of the attractive agates and carnelian used by Clovis stoneknappers, which lies 50 km to the east, north of Ephrata.



Map of the East Wenatchee Clovis site area. Columbia River (altitude 606 feet above sea level); **A**, Pangborn Airport (1,220 feet); **B**, East Wenatchee site (1,200 feet); **C**, find-spot of large obsidian fluted point (knife) on Badger Mountain (3,300 feet). Scale in kilometers.



1954 aerial view of the Pangborn Airport vicinity, East Wenatchee. Arrow marks Clovis site location within large current ripple or shallow gully which drains northward towards the edge of the Columbia River valley trench. Land under cultivation is planted in wheat. Photo courtesy of the North Central Washington Museum, reproduced by permission.



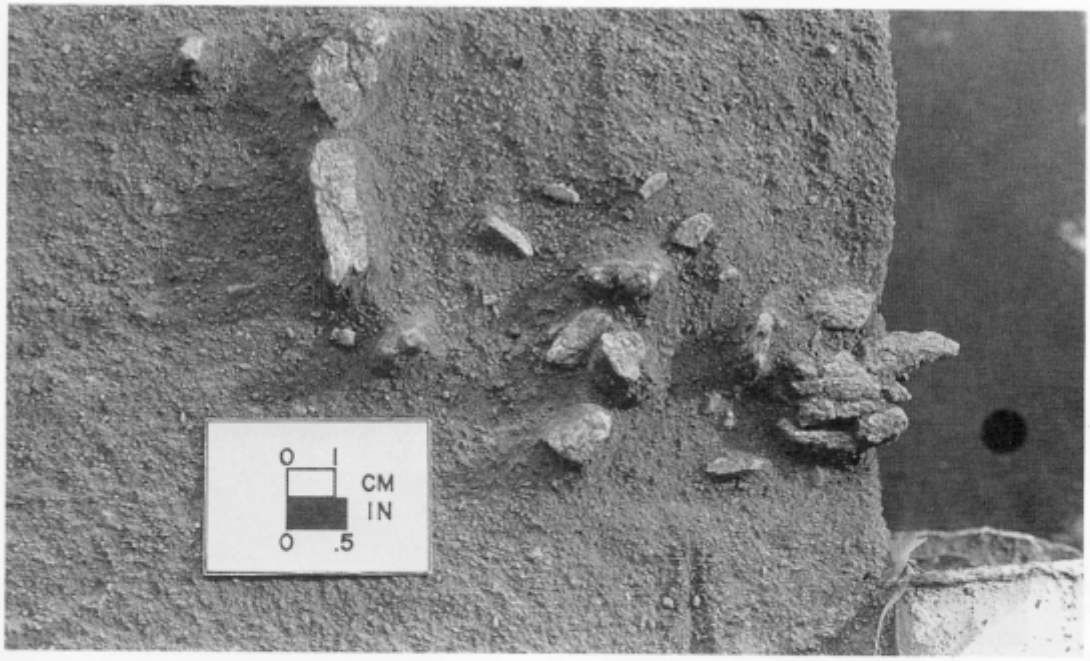
1978 aerial view of the Pangborn Airport vicinity, East Wenatchee. Arrow marks Clovis site location, at the edge of an orchard with 8-10 year-old tree growth. Photo courtesy of the North Central Washington Museum, reproduced by permission.

Betty Knop removes earth with wooden wand around largest fluted knife in Richey Clovis Cache (specimen 31, plan view). Underneath it is another fluted knife (specimen 32); in the foreground is a sidescraper of chalcedony (specimen 33). The copper cutouts mark locations of artifacts collected in 1988. Photo taken in October, 1990.

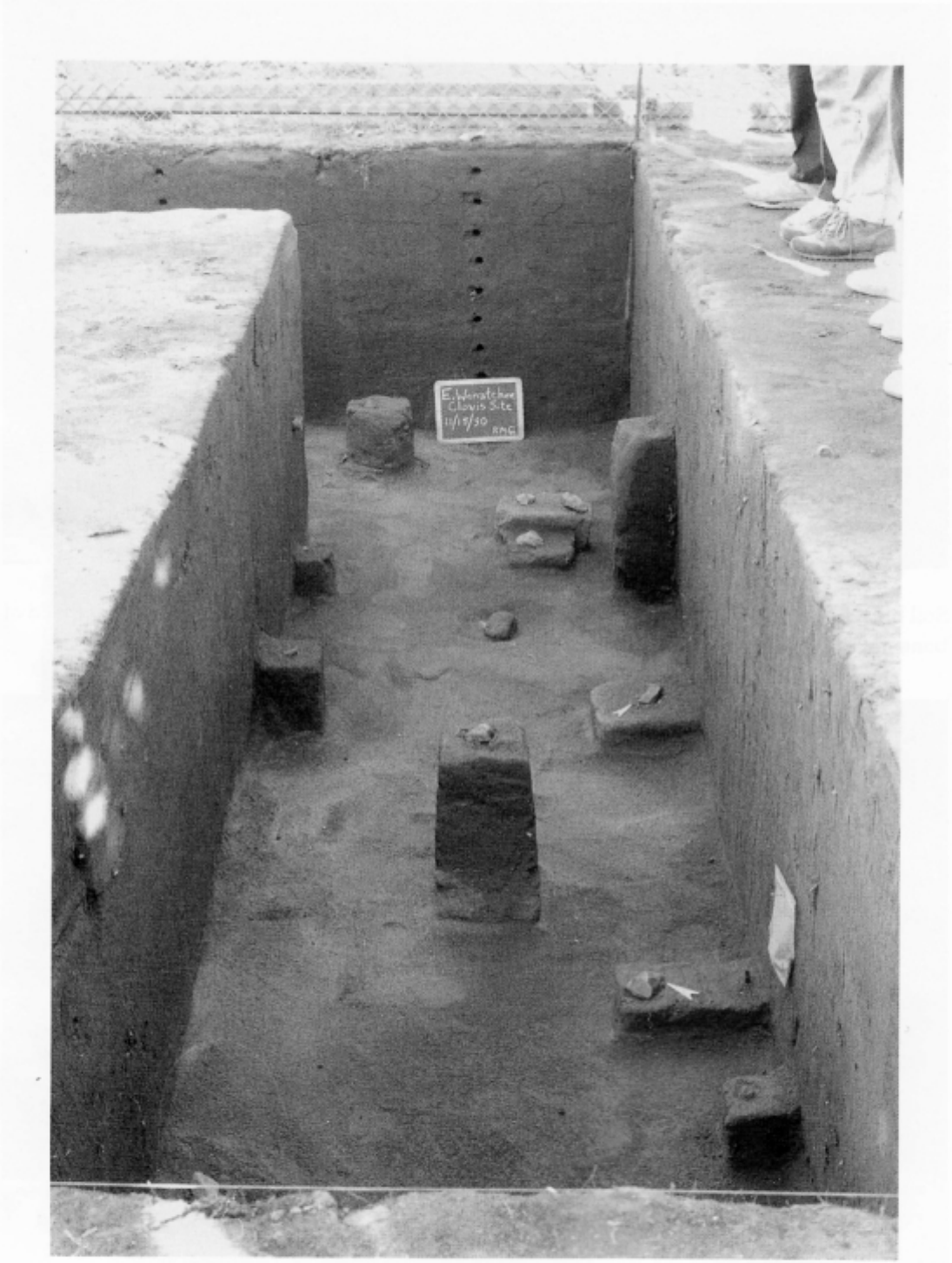
Bill Pickard removes stump of apple tree in 1-m square N103W102, November 1990. The base of a fluted knife (specimen 29, plan view) may be seen along with a copper cutout representing a flaked stone celt, which was collected in 1988 (specimen 30, plan view).

View of the Richey Clovis Cache, November 1990. Soil block awaits removal; wooden wands line edge of ancient pit feature and occupy key datum points on top of soil block. Three flaked stone bifaces (specimens 57, 58 and 60, plan view) and mass of bone fragments (specimen 54) remain *in situ*. Copper cutouts mark locations of artifacts removed in 1987, 1988 and 1990.

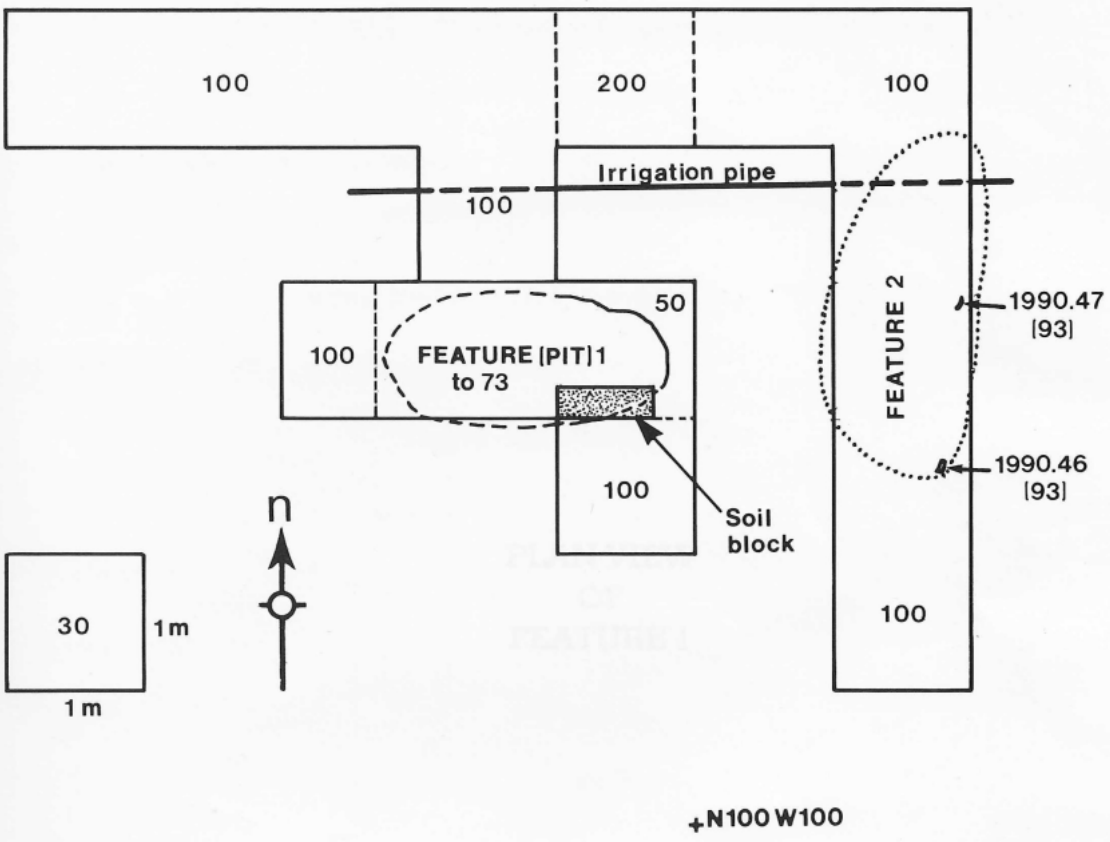
Soil block in Richey Clovis Cache awaiting removal. Small white arrow points to exposed end of bone mass – thought to be partially digested bone fragments excreted by a wolverine.



Large fragments of bone from mass within soil block. Many minute pieces have already been mapped and removed. The bone represents at least one bi-beveled rod that was gnawed by a scavenger – likely a wolverine.



Eastern limb of L-shaped trench, looking north. Arrows mark sidescraper and utilized prismatic blade on floor of pit (Feature 2). Various geofacts – mostly ice-rafted basalt cobbles – have been isolated on pilasters. Note soil sampling locations in north wall. November 1990.



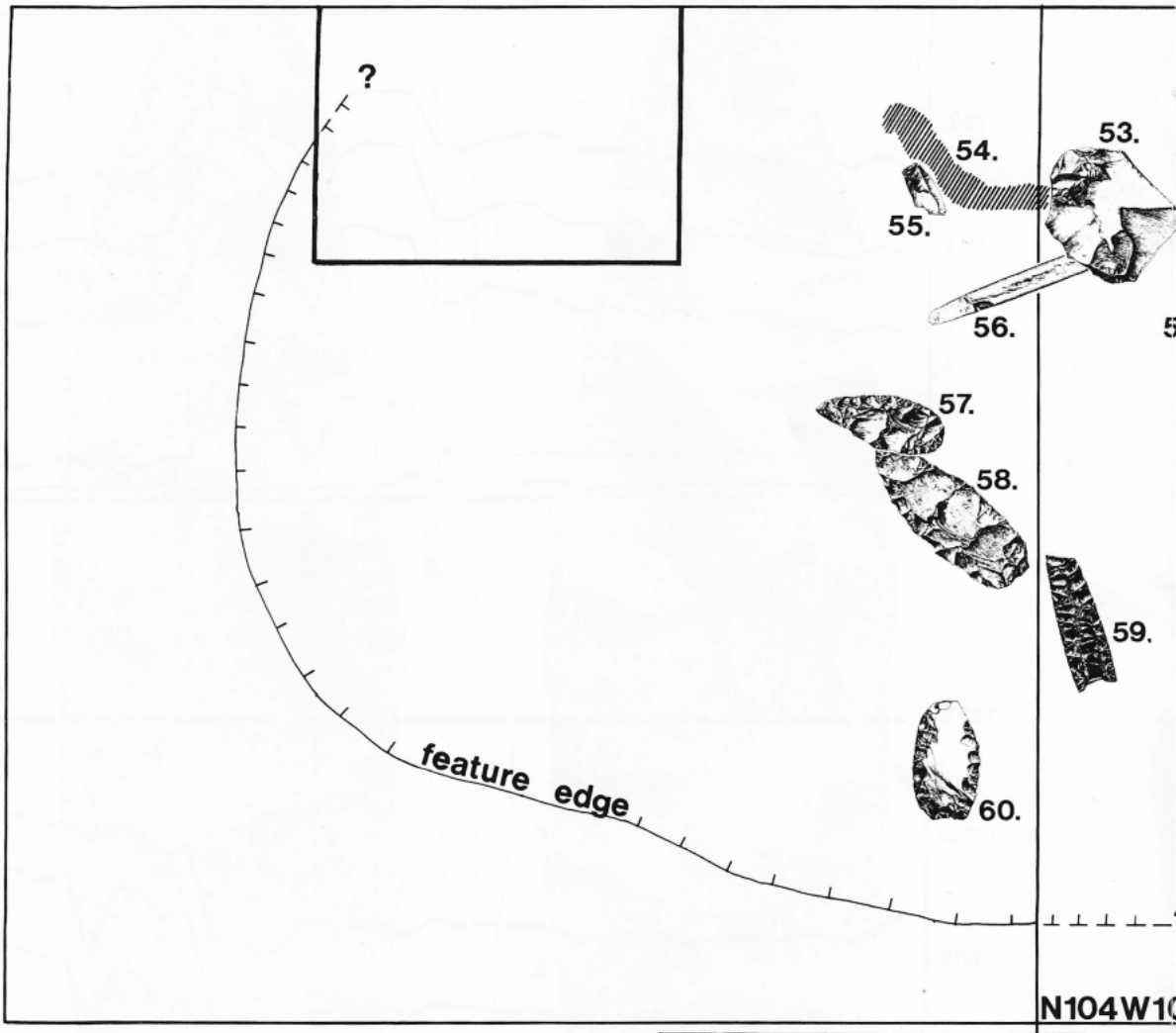
Map of the central area of excavations, October - December, 1990. The presumed outlines of Feature 1 (Richey Clovis Cache) and Feature 2 are shown. The western half of the soil block was later excavated at the Buffalo Museum of Science resulting in the discovery of animal bone fragments, small flakes and one flaked tool (an utilized flake-blade). The positions of the two flaked tools found resting on the floor of Feature 2, 93 cm below surface, are indicated with arrows.

Limits of downward excavation are given (in cm).

Plan view of Richey Clovis Cache (Feature 1), East Wenatchee Clovis site. **Specimens 1-24** were discovered by orchard workers in 1987 and their exact positions within the pit are unknown; **specimen 59** was discovered in 1987 by amateur and professional archaeologists; **specimens 25-28** and **30** were removed in 1988 by Washington State University archaeologists; all other bone and stone artifacts were recovered in 1990 by R. M. Gramly and colleagues.

The unexcavated portion of the soil block is shown. A bi-beveled bone rod in the wall of 1-m square N103W101 remains *in situ* along the southern margin of the pit (**specimen 45**, blackened).

PLAN VIEW
OF
FEATURE 1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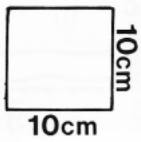
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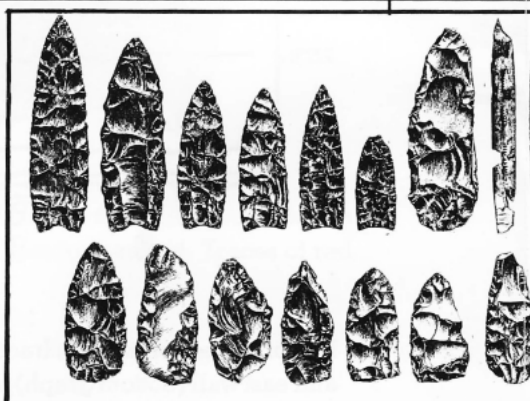

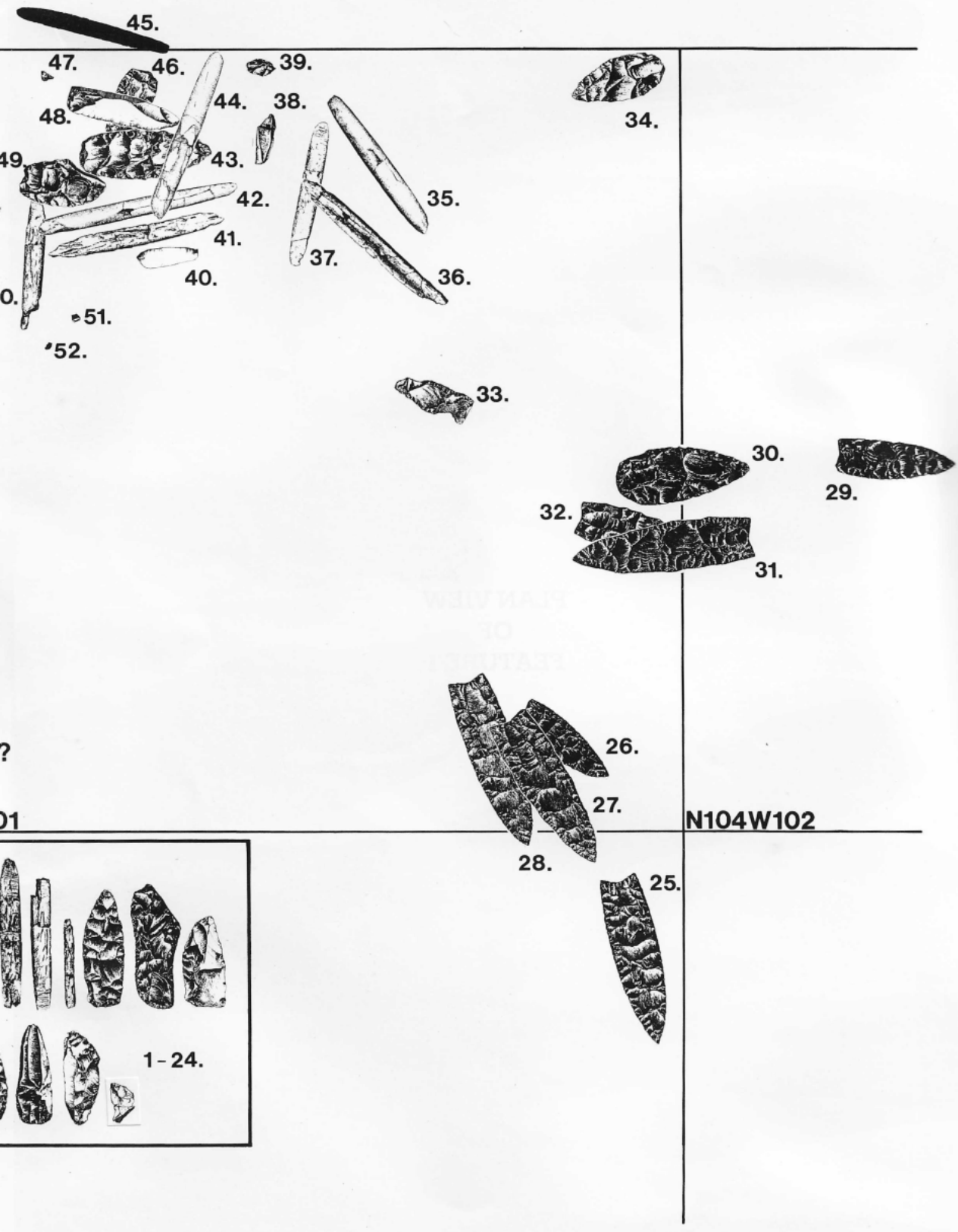
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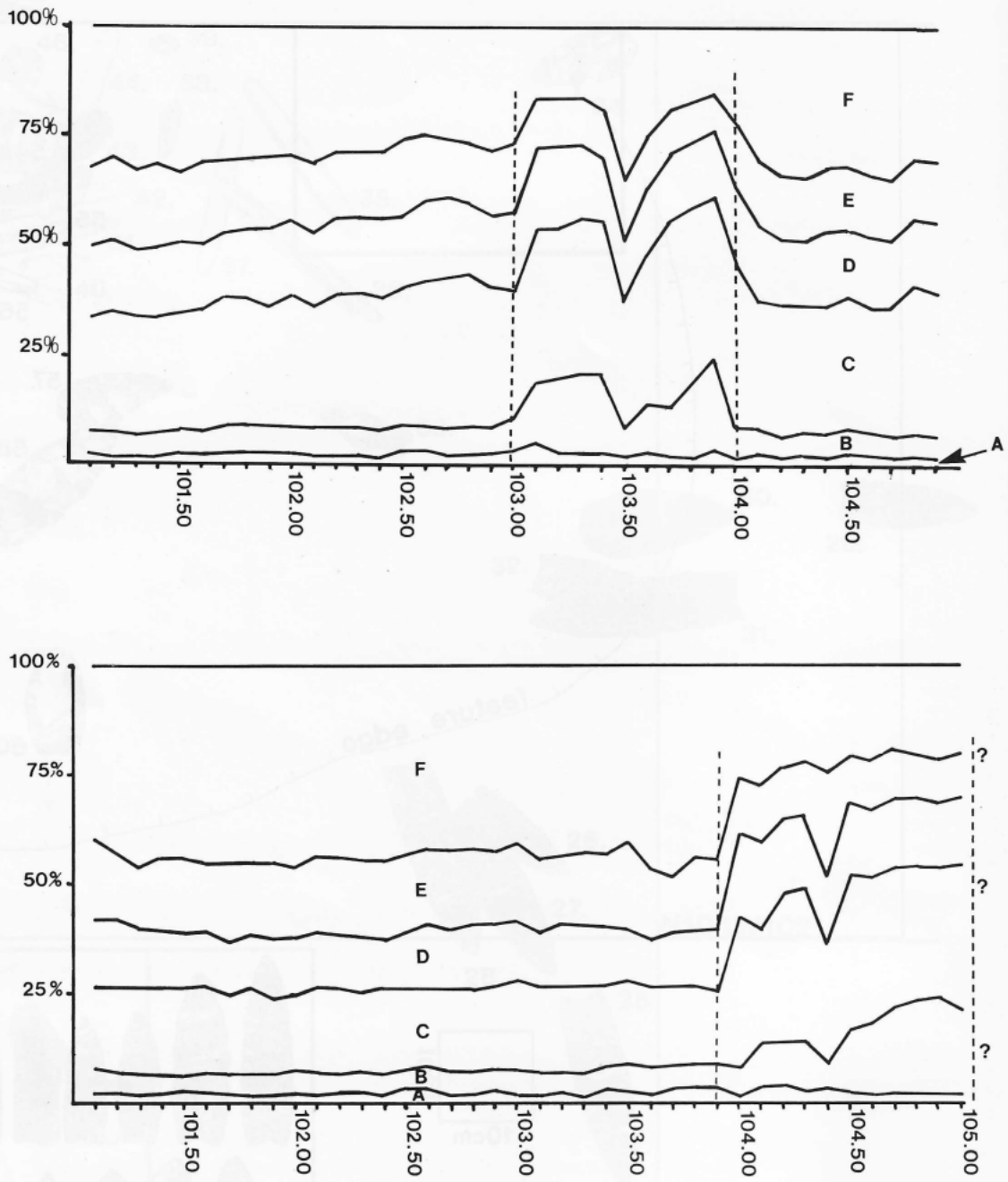
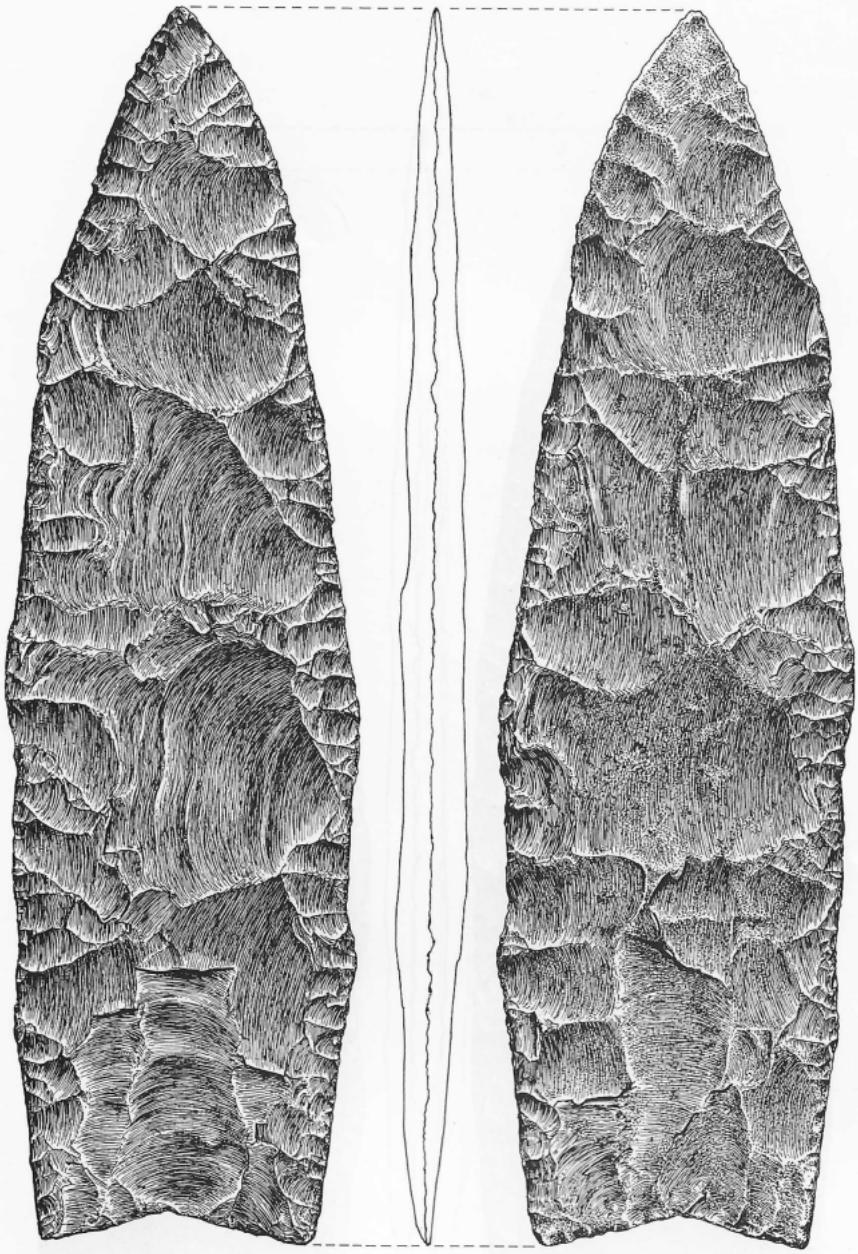
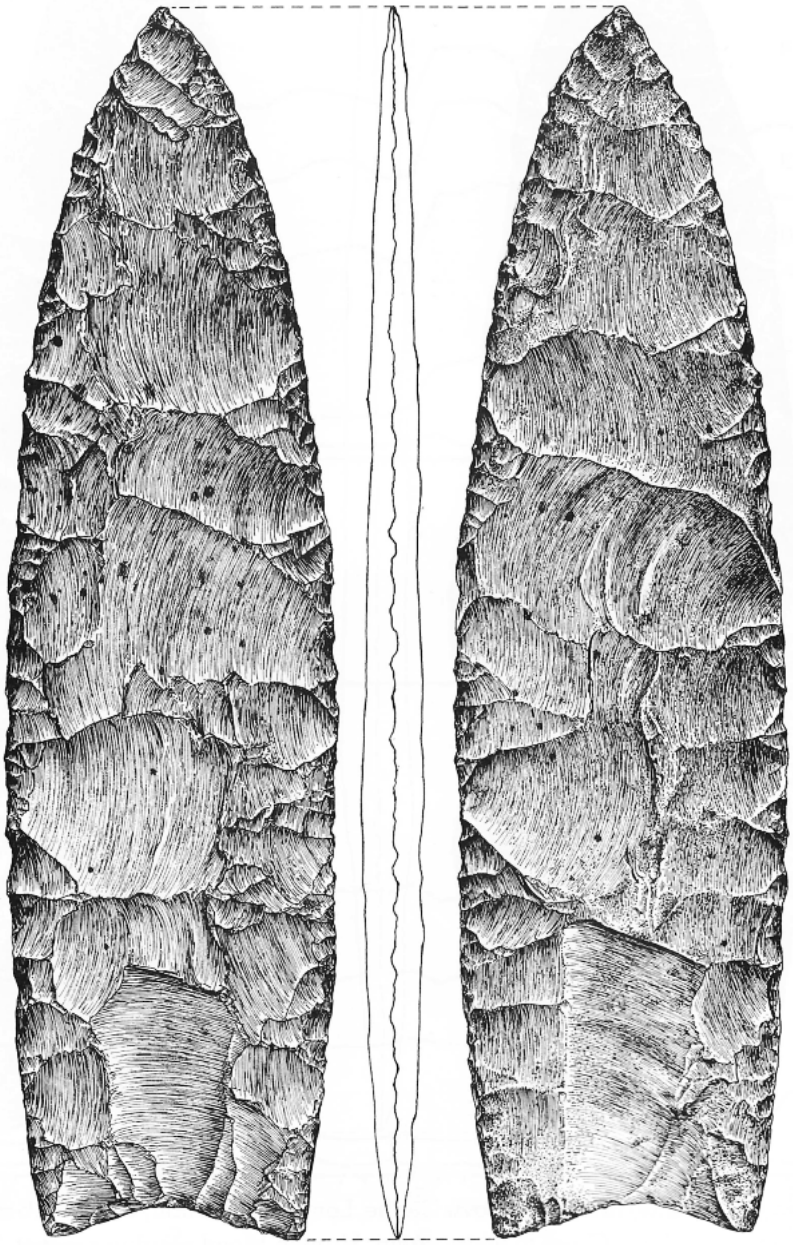


Plot of sieved soil sample fractions for samples at 10 cm intervals along the west wall (top graph) and east wall (bottom graph) of L-shaped trench, East Wenatchee Clovis site, 1990 excavations. The samples were taken at the 65 cm level below surface. Boundaries of Feature 2 are presumed to exist at abrupt changes in slope (dashed line) at points N103.00 and N104.00 (west wall) and N103.80 (east wall.



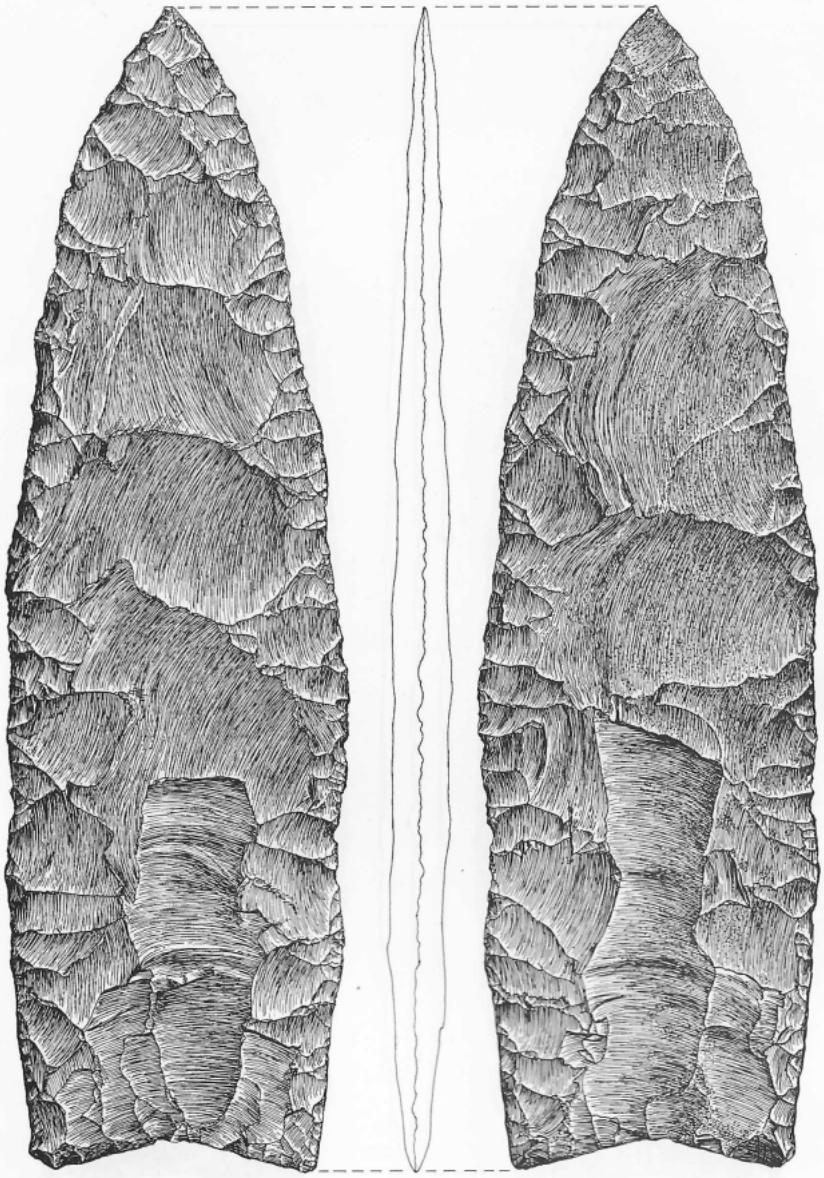
Largest fluted point (knife) in Richey Clovis Cache. Length 232.5 mm, width 65.5 mm, thickness 11.4 mm, weight 209.8 gr. Clear to white agate. Human blood residue present. Traces of red ochre around hafting area. Two-thirds actual size.

Cast available from Lithic Casting Lab, Troy, Illinois 62294.



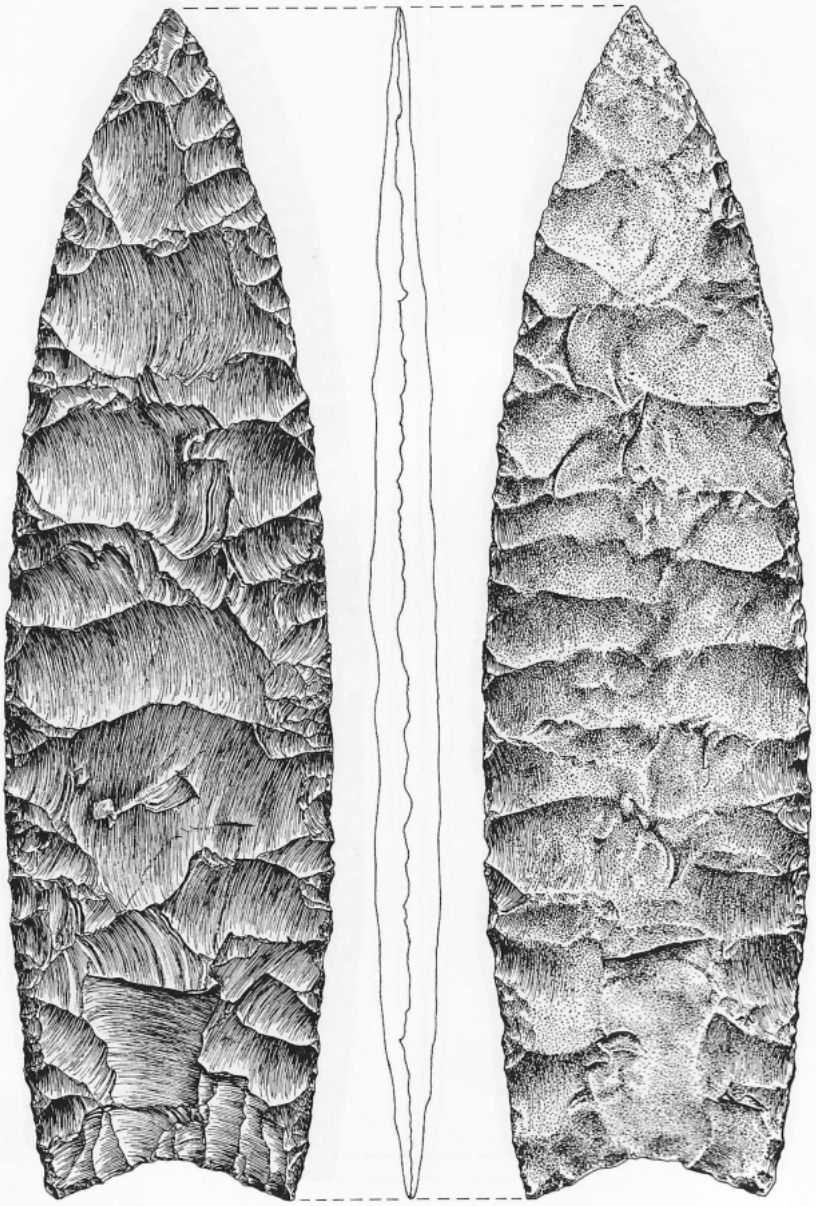
Large, unresharpened fluted point (knife), Richey Clovis Cache. Length 230 mm, width 62 mm, thickness 12 mm, weight 196 gr. Clear to white moss agate. Presumed to have bison and cervid blood residue upon it. Traces of red ochre around hafting area. Two-thirds actual size.

Cast available from Lithic Casting Lab, Troy, Illinois 62294.

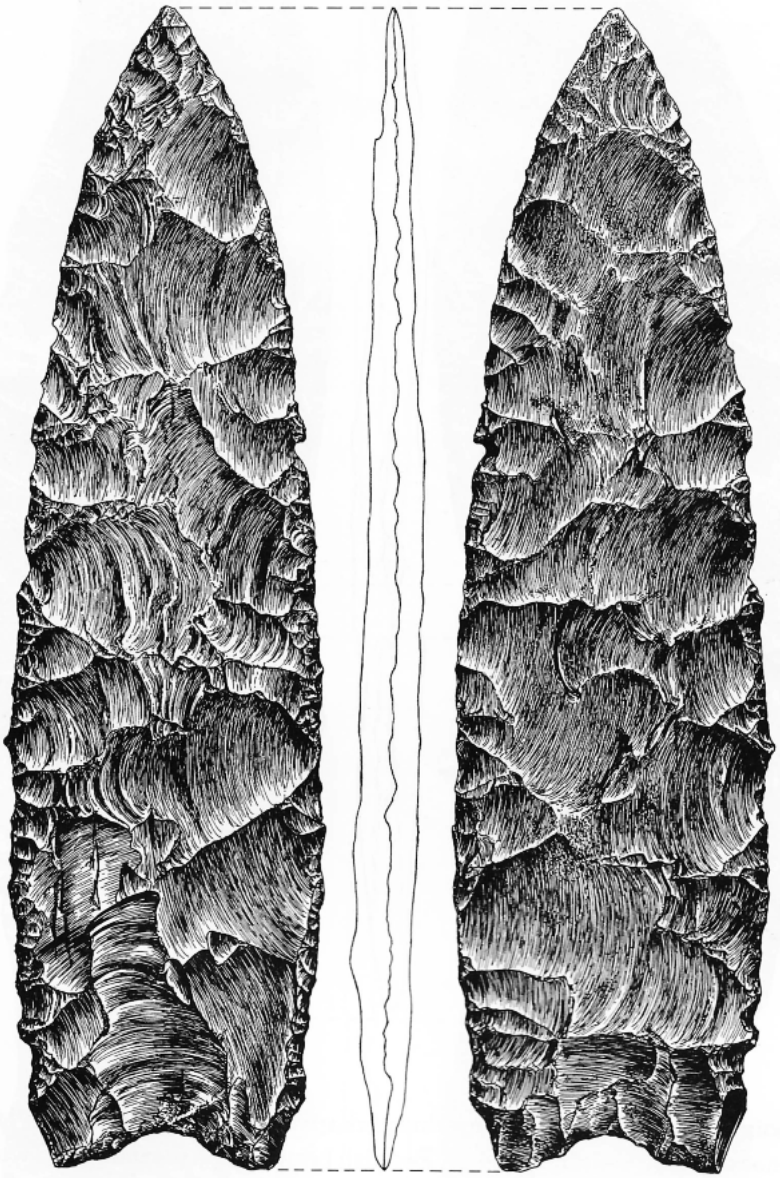


Large, resharpened fluted point (knife), Richey Clovis Cache. Length 220 mm, width 56 mm, thickness 12 mm, weight 195 gr. Clear to white agate. Presumed to have bison and cervid blood residue upon it. Traces of red ochre around hafting area. Two-thirds actual size.

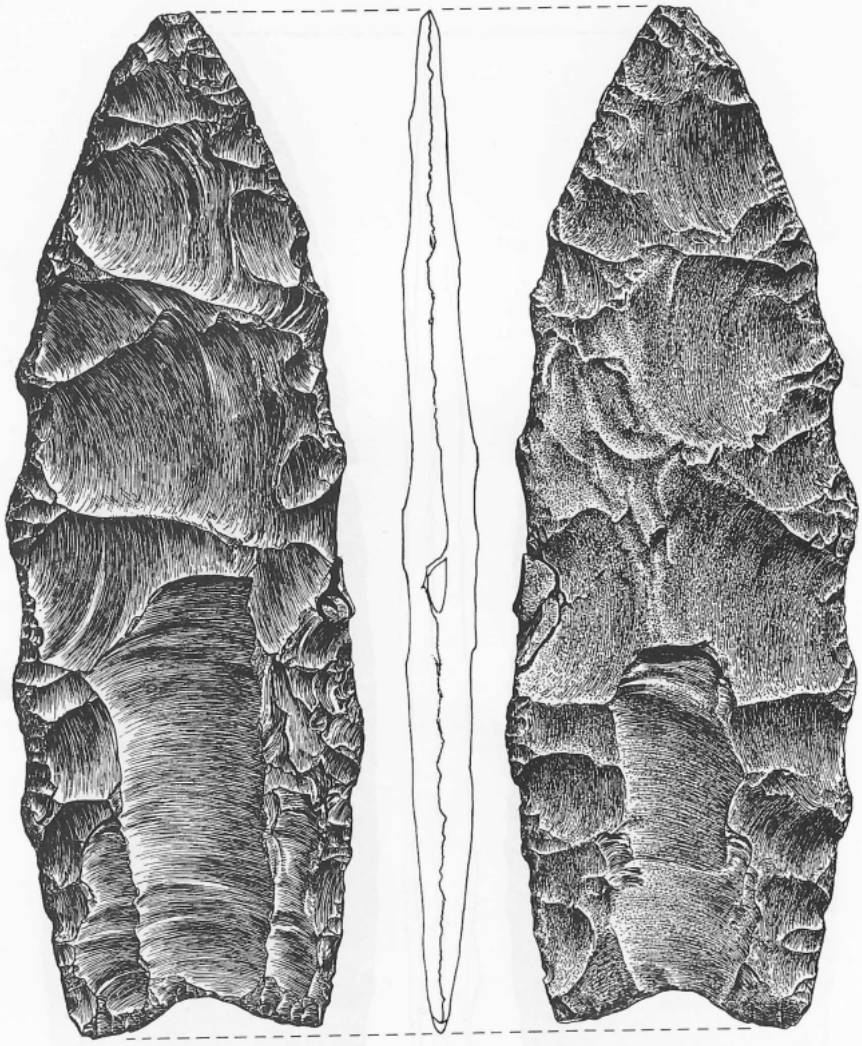
Cast available from Lithic Casting Lab, Troy, Illinois 62294.



Large fluted point (knife), Richey Clovis Cache. Length 223 mm, width 61 mm, thickness 12 mm, weight 178.3 gr. Banded tan and reddish brown agate. Two-thirds actual size.



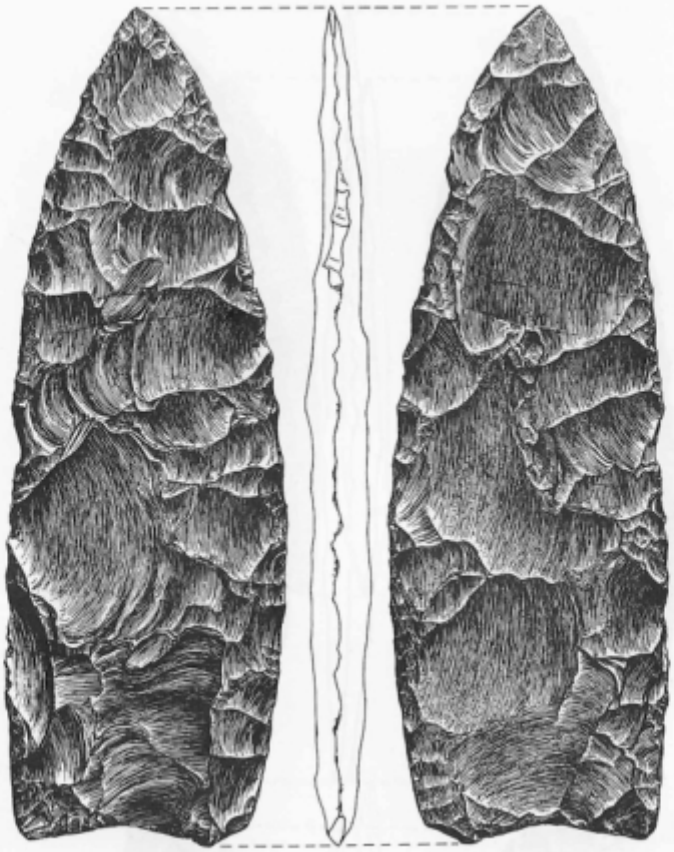
Large fluted point (knife), Richey Clovis Cache. Length 215 mm, width 58 mm, thickness 12 mm, weight 162.8 gr. Banded tan and reddish brown agate. Two-thirds actual size.



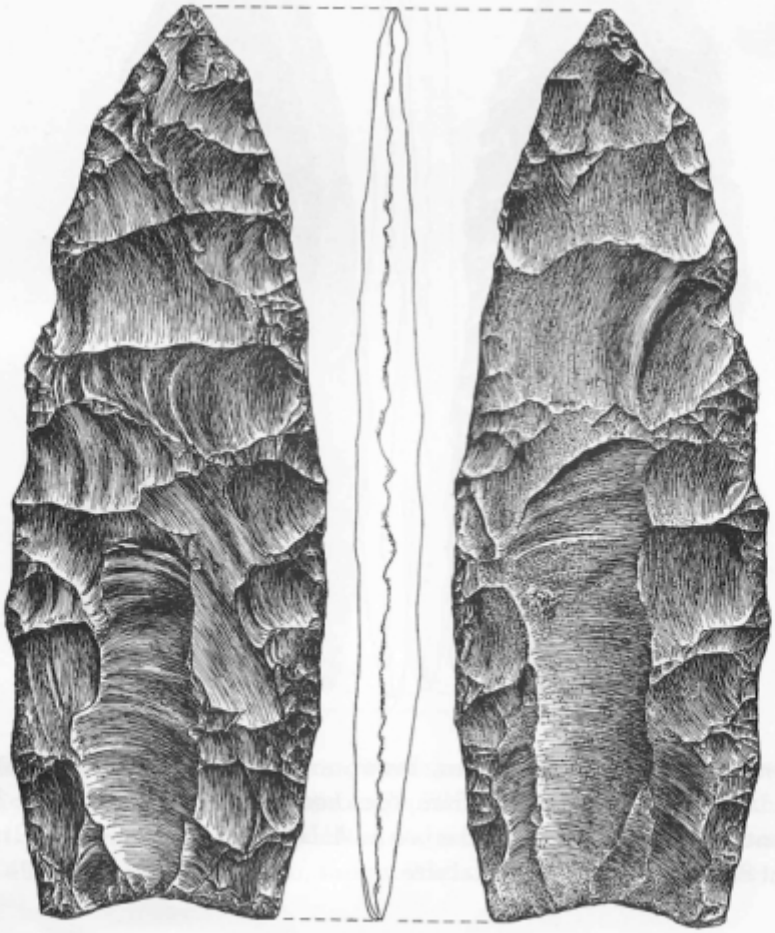
Large fluted point (knife) with sinuous edge due perhaps to resharpening. Length 191 mm, width 65 mm, thickness 13 mm, weight 183.4 gr. Reddish brown agate (carnelian). Two-thirds actual size.

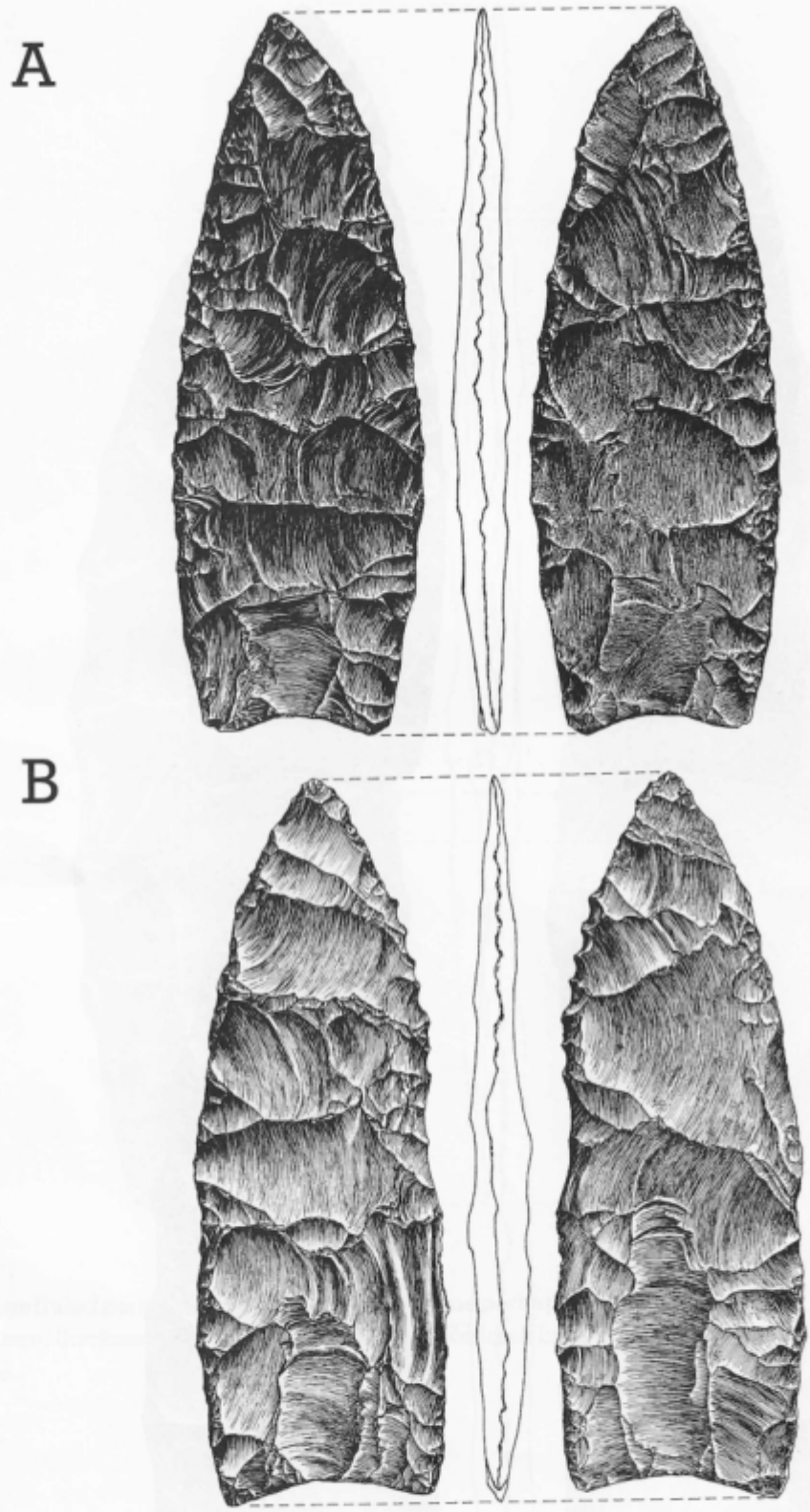
A, fluted point (knife) of carnelian with cream-colored band. Length 153 mm, width 50.6 mm, thickness 11.1 mm, weight 98.4 gr. ***B***, fluted point (knife) of identical raw material to ***A***. Length 167 mm, width 59 mm, thickness 11.5 mm, weight 129.5 gr. Two-thirds actual size.

A



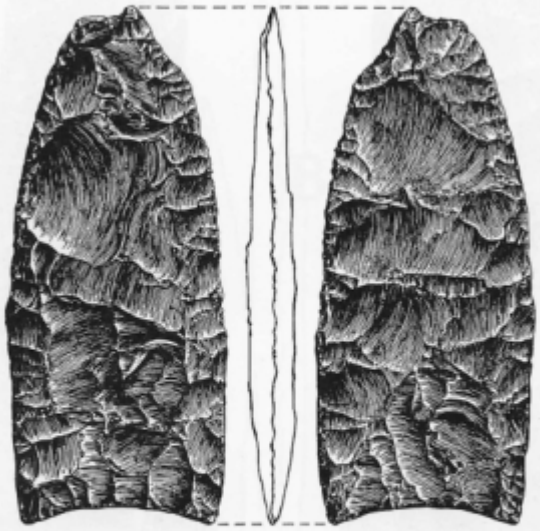
B



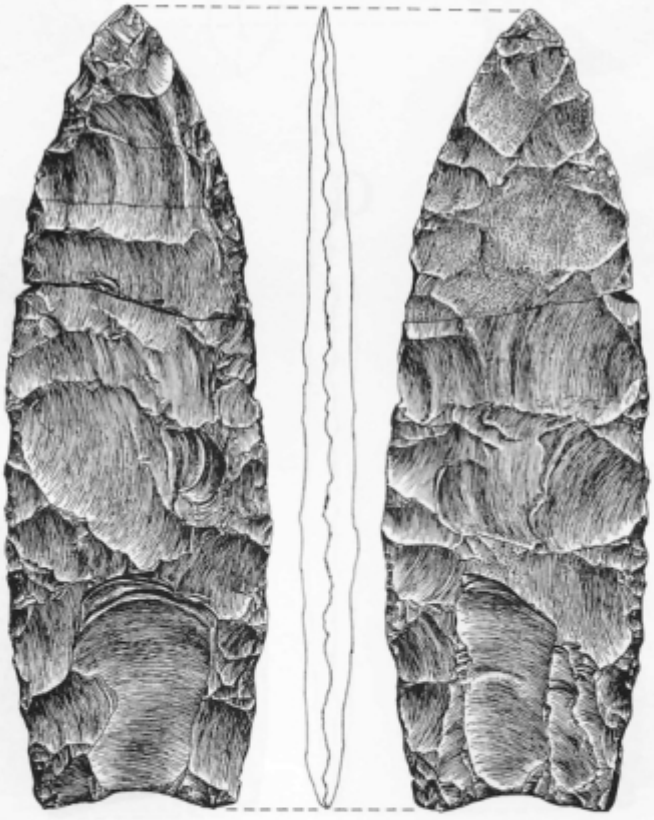


A, fluted point (knife) of variegated (tan, brown and light orange-gray) agate. Tip shows resharpening. Length 140 mm, width 48 mm, thickness 10 mm, weight 74.7 gr. ***B***, fluted point (knife) with denticulate edge. Variegated agate as ***A***. Length 140 mm, width 49 mm, thickness 12 mm, weight 86.0 gr. Two-thirds actual size.

A

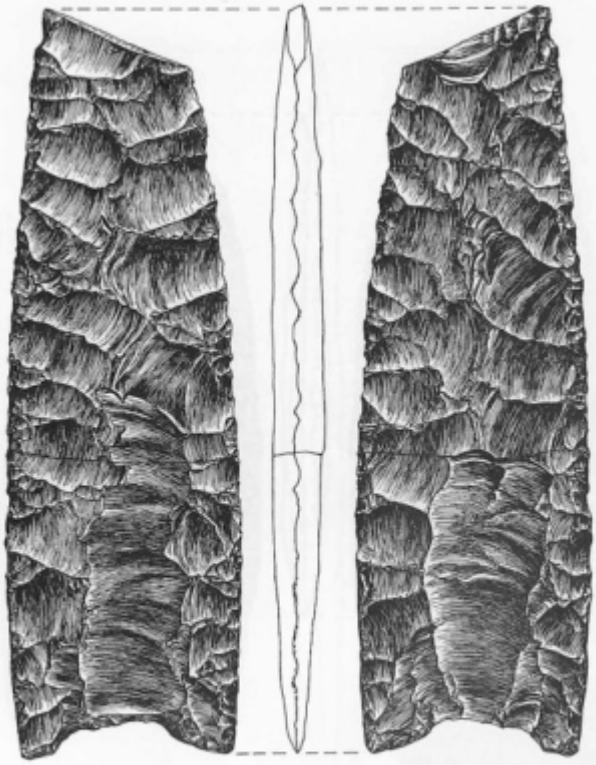


B

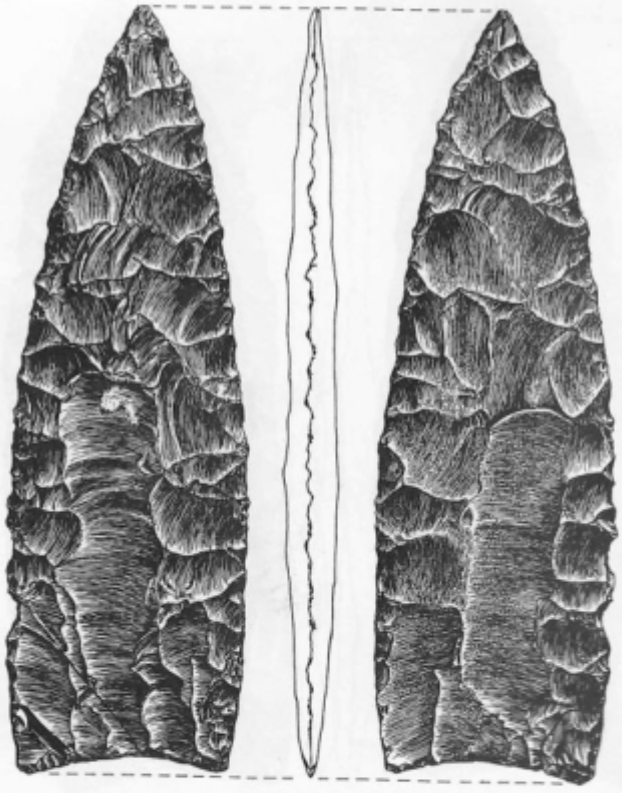


A, former fluted projectile point showing reworked (damaged) tip. Variegated agate or chert (pale red, light grayish green, orange). Length 105 mm, width 40 mm, thickness 9 mm, weight 39.1 gr. ***B***, fluted point (knife) of grayish-tan and red-brown agate, recently broken. Length 147 mm, width 49 mm, thickness 11 mm, weight 78.6 gr. Two-thirds actual size.

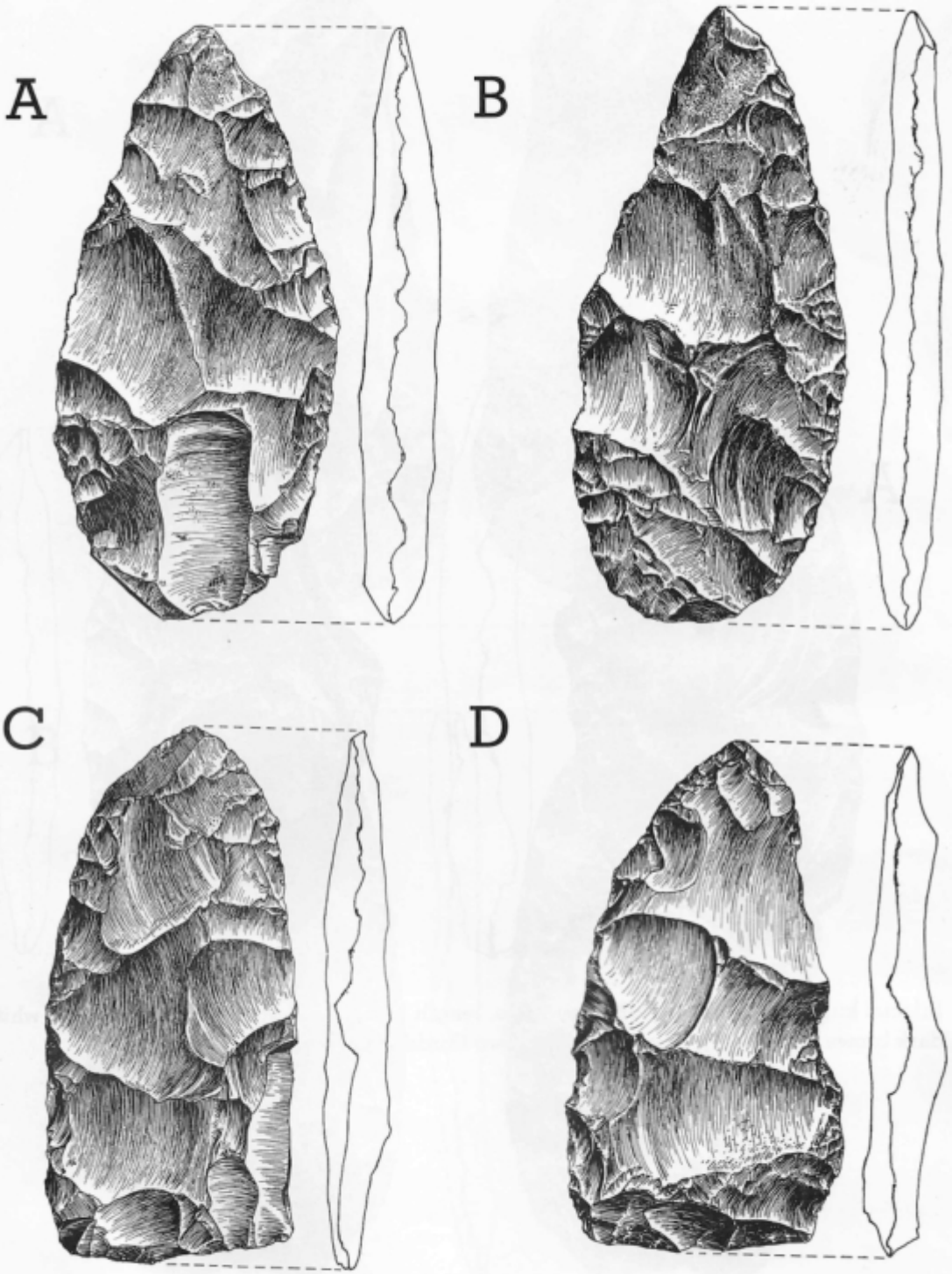
A



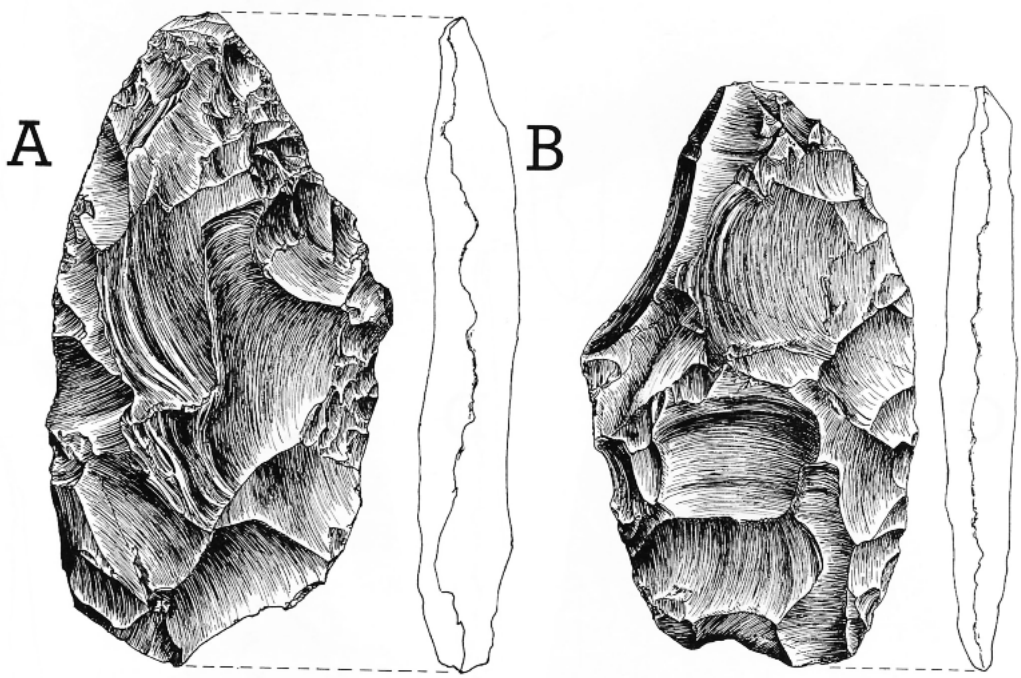
B



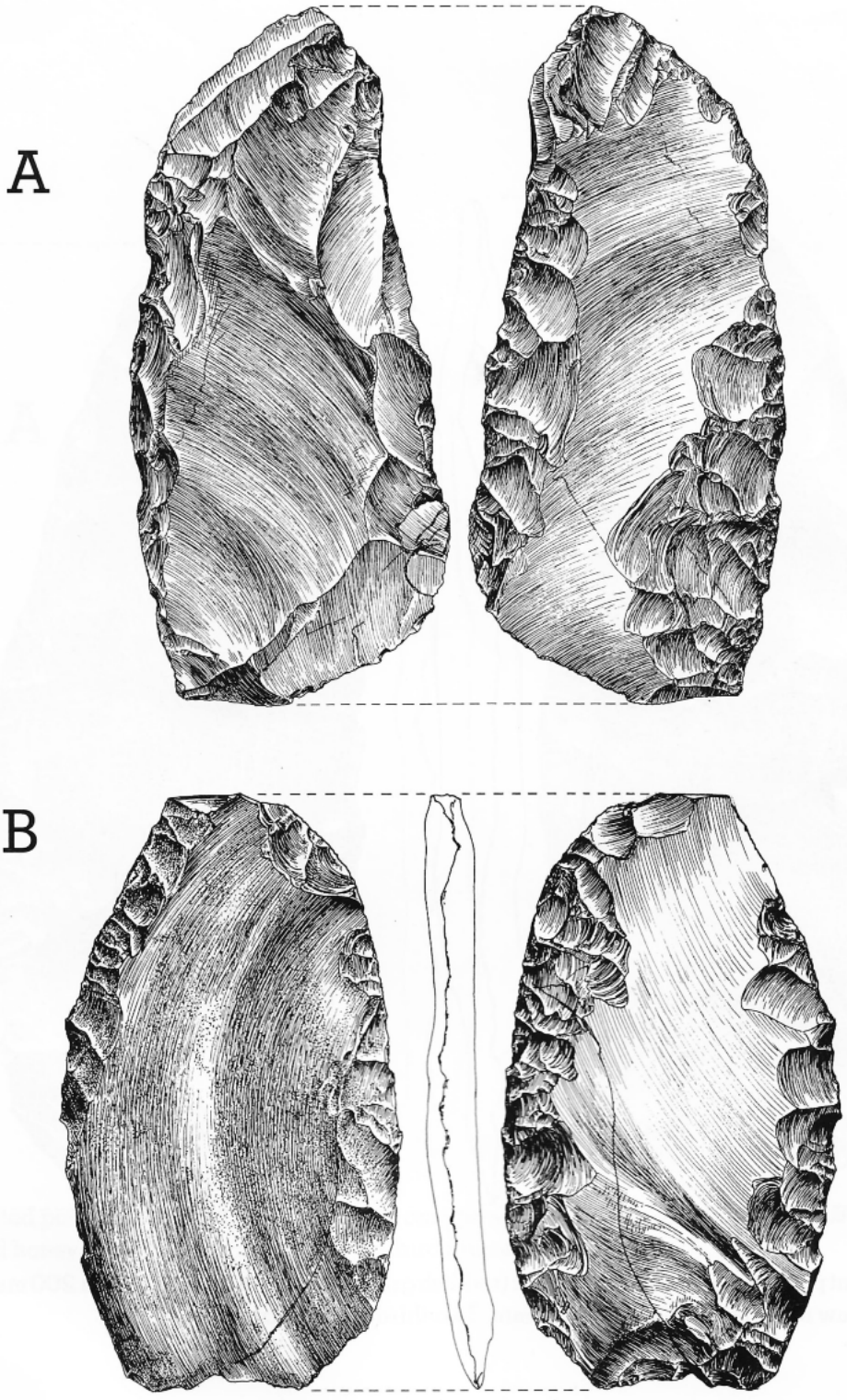
A, fluted projectile point, tip broken off anciently, modern snap at mid-point. Variegated agate (tan, honey, light gray). Length 141 mm, width 44 mm, thickness 10 mm, weight 74.7 gr. ***B,*** fluted projectile point, corner snapped off recently. Carneilian (red-brown agate). Length 145 mm, width 46 mm, thickness 11 mm, weight 68.6 gr. Two-thirds actual size.



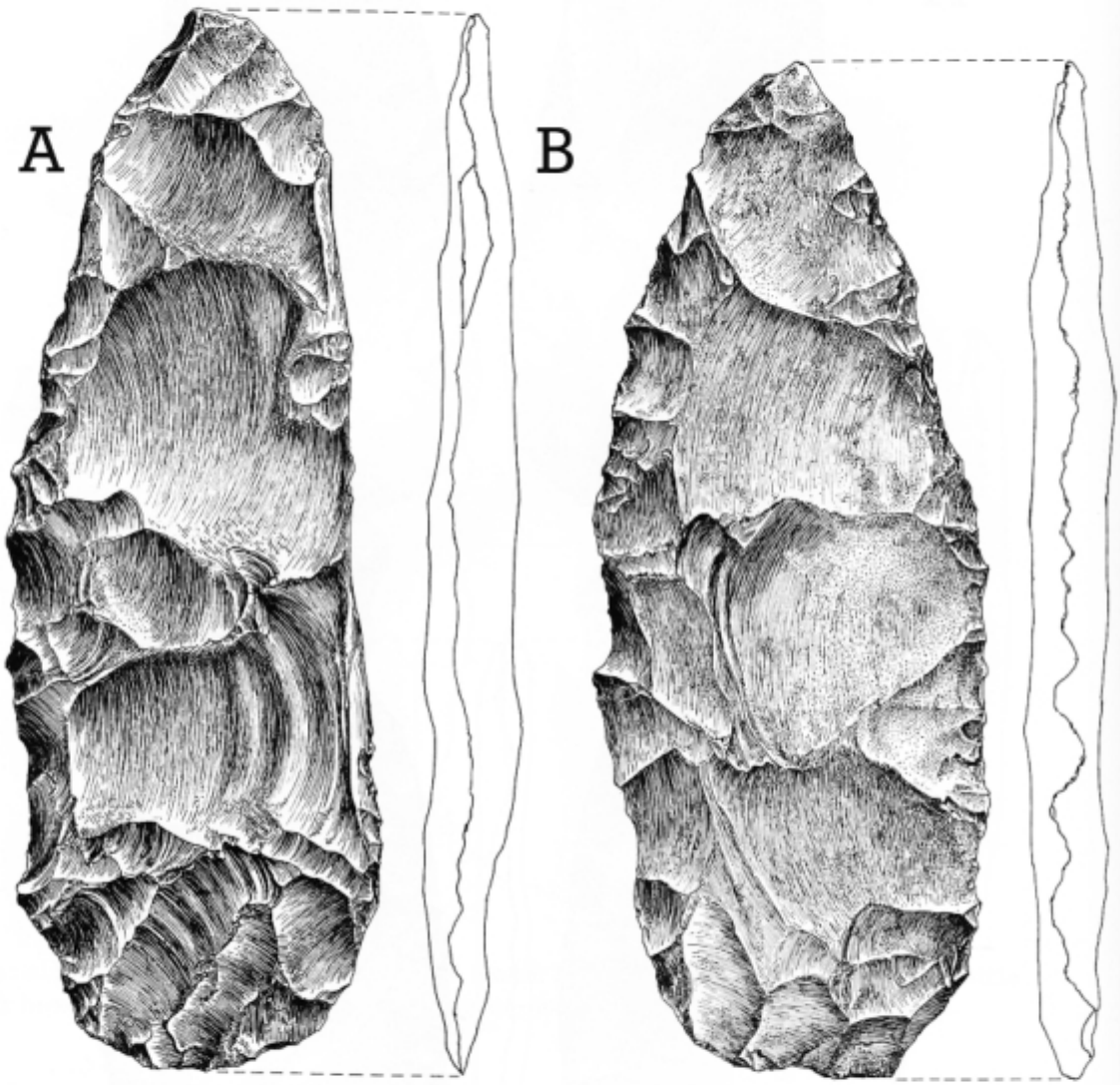
Bifacial knives. ***A***, honey agate, length 124 mm; ***B***, honey agate, length 129 mm; ***C***, variegated agate (brown, gray-white), length 114 mm; ***D***, variegated agate or chert (reddish, light gray), length 107 mm. Two-thirds actual size.



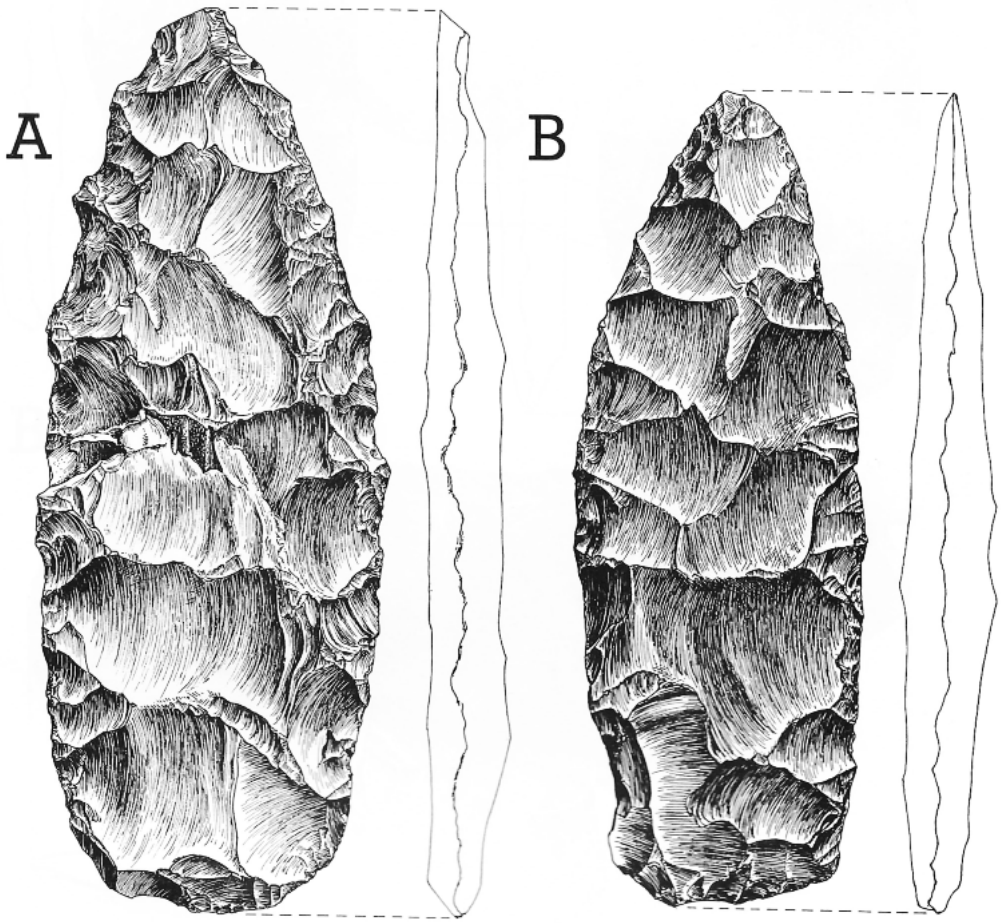
Bifacial knives. ***A***, reddish, light gray agate, length 123 mm; ***B***, variegated agate (gray-white, dark brown, light gray), length 110 mm. Two-thirds actual size.



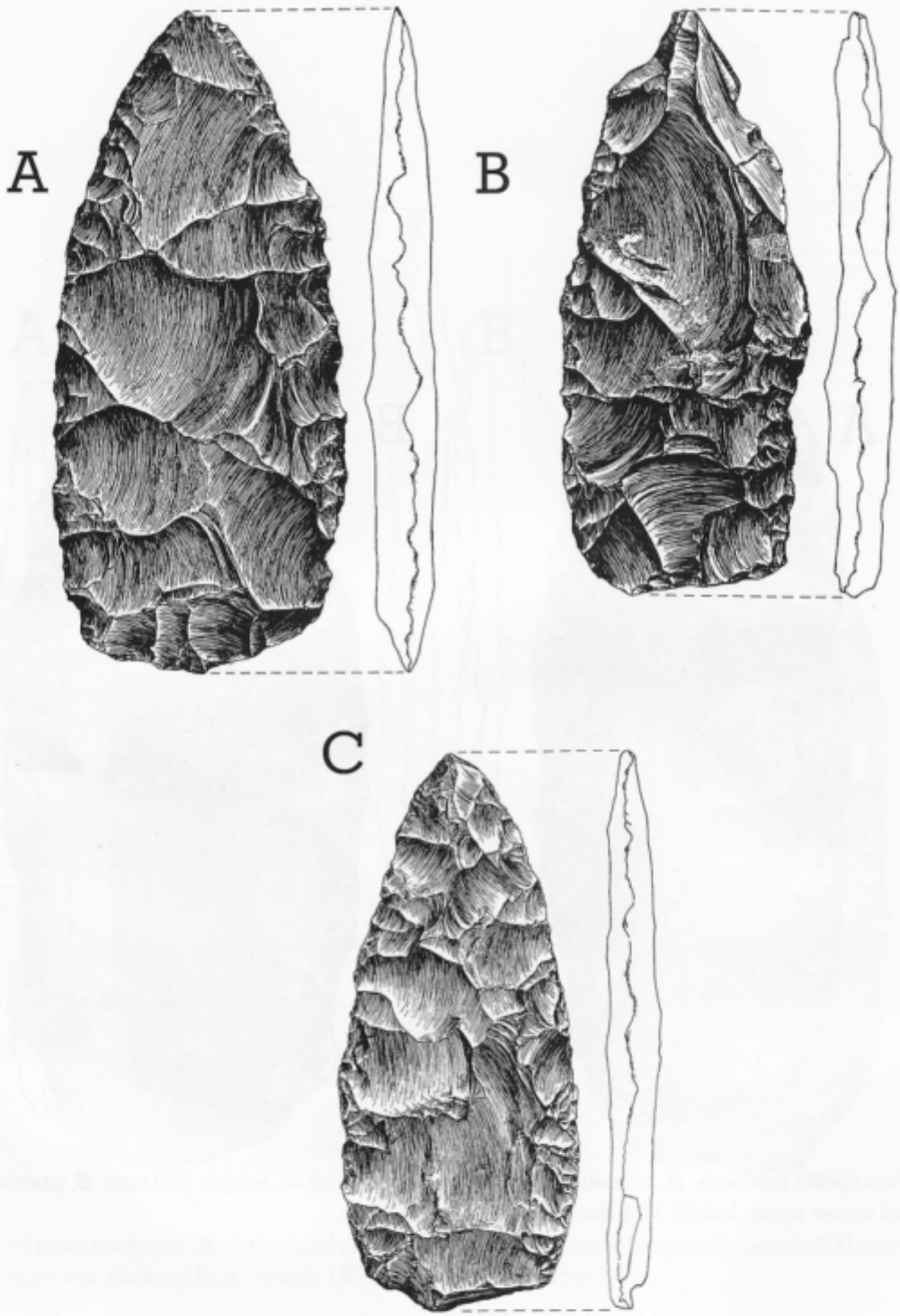
Bifacial knives showing modification of their edges only. ***A***, light orange-brown and orange-gray agate, length 140 mm; ***B***, variegated carnelian, length 122 mm. Two-thirds actual size.



Fluted point preforms. ***A***, variegated chert (reddish gray and grayish green), length 200 mm; ***B***, identical raw material to ***A***, length 192 mm. Two-thirds actual size.

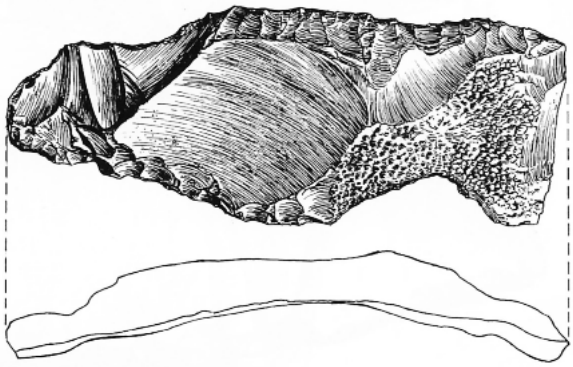


Fluted point preforms. ***A***, carnelian with orange-white patches, length 170 mm; ***B***, grayish tan and honey agate, length 154 mm. Two-thirds actual size.

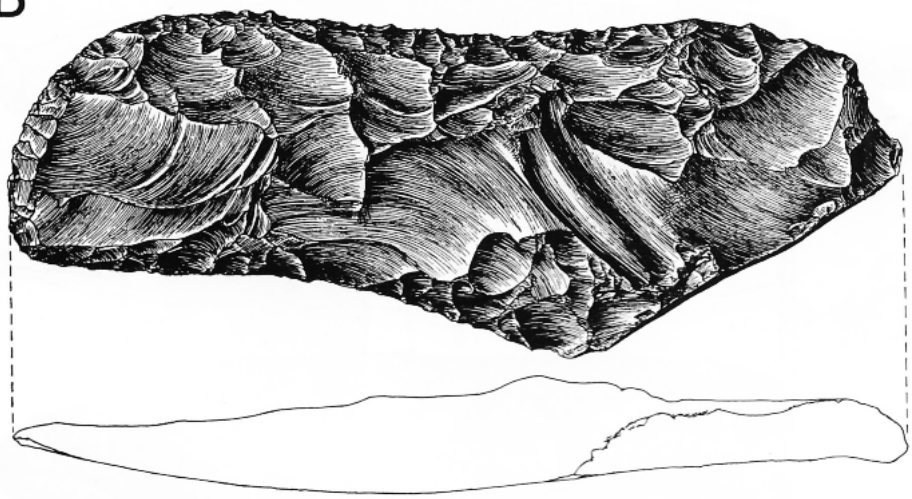


Fluted point preforms. ***A***, variegated agate (tan, red-brown, light gray), length 140 mm; ***B***, variegated agate (light gray, red-brown, orange-white), length 122 mm; ***C***, variegated agate (light gray, tan, yellow-brown), length 117 mm. Two-thirds actual size.

A

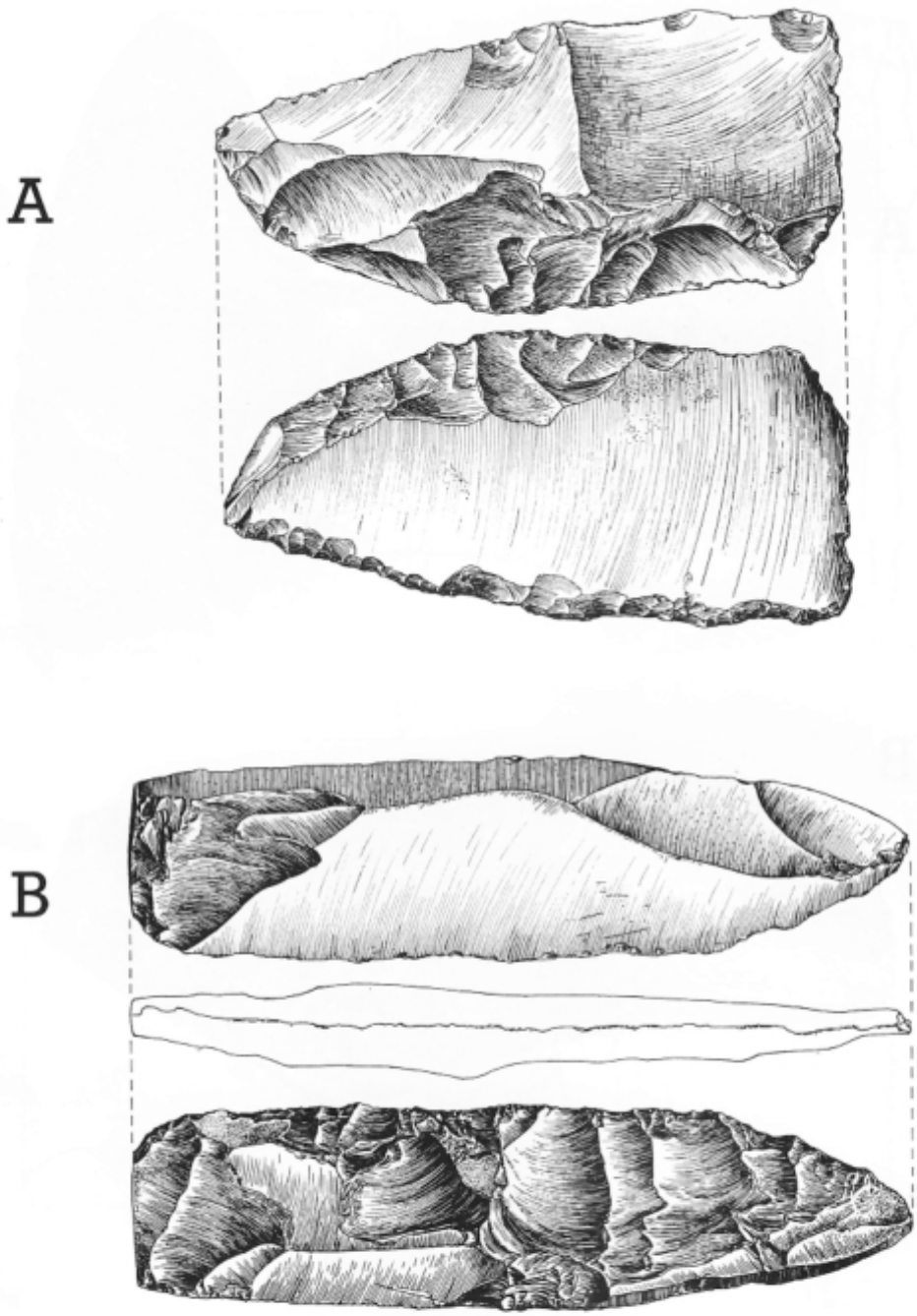


B

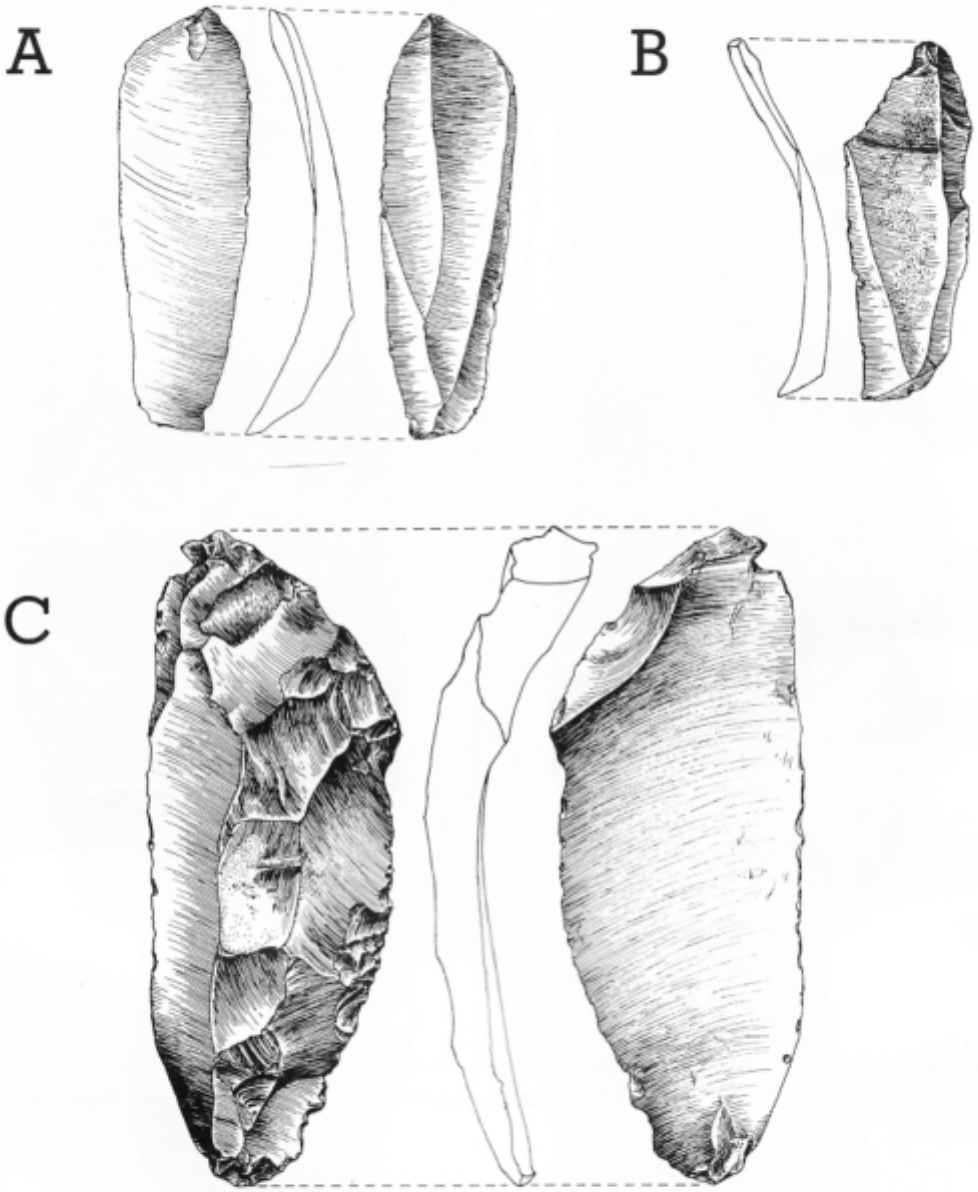


A, sidescraper of lemon chalcedony, length 103 mm; ***B***, combination sidescraper and endscraper, yellow jasper (chert), length 163 mm. Two-thirds actual size.

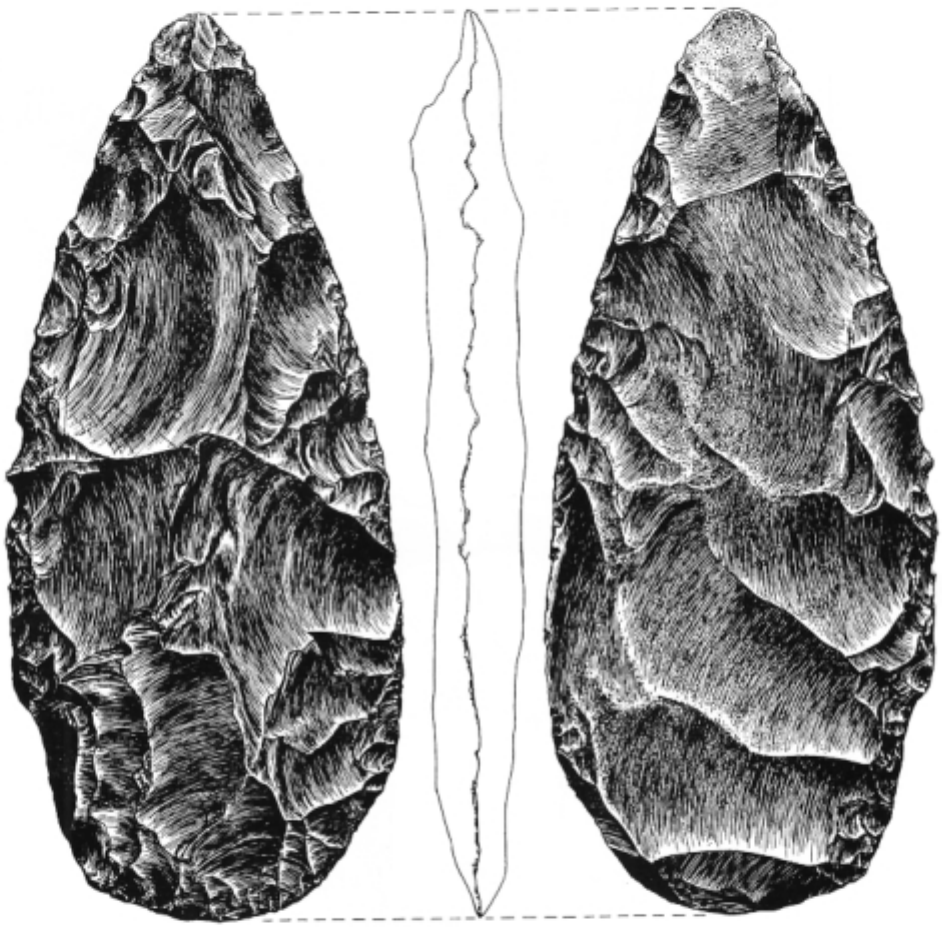
Cast of ***B*** is available from Lithic Casting Lab, Troy, Illinois 62294.



A, sidescraper of variegated agate (red-brown, orange-white, light gray), length 119 mm; ***B***, long sidescraper, reddish brown agate, length 146.5 mm. *B* perhaps functioned as a knife. Two-thirds actual size.

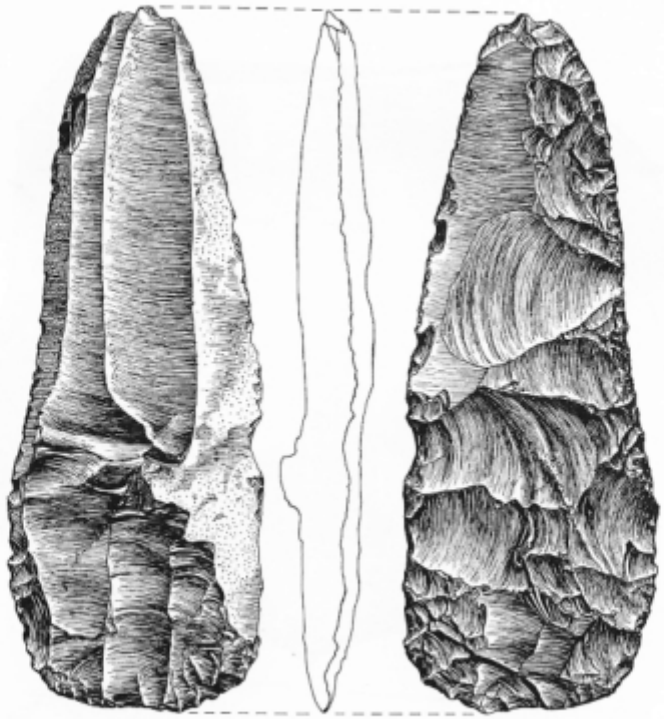


Prismatic blades, all utilized as cutting tools, ***A***, red-brown agate (carnelian), length 80 mm; ***B***, carnelian, length 69 mm; ***C***, variegated agate (red-brown, tan, light yellow-gray), length 123 mm. Two-thirds actual size.

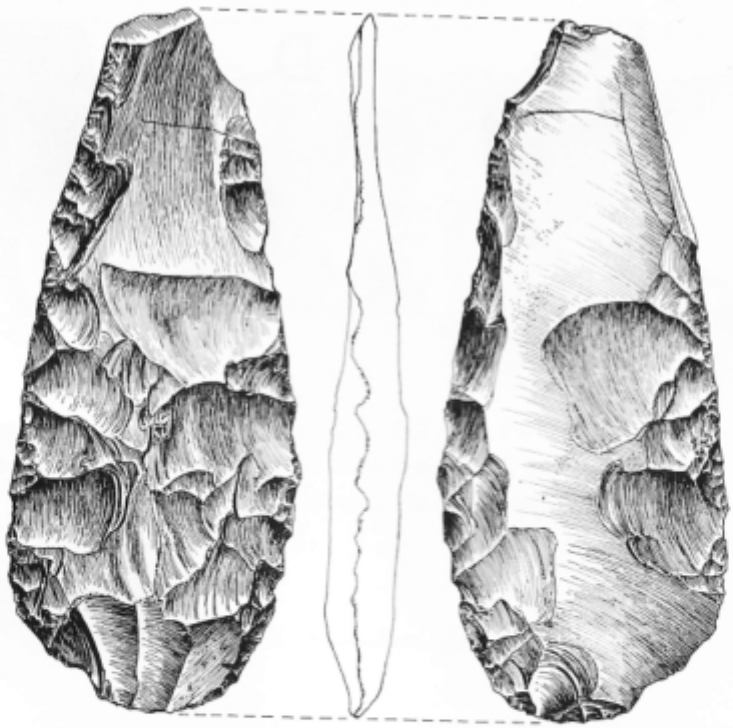


Celt. Fine striae or scratches resulting from use are present on the bit. Carnelian with orange-white patches. Length 173 mm, width 74 mm, thickness 18 mm, weight 250.3 gr. Two-thirds actual size.

A

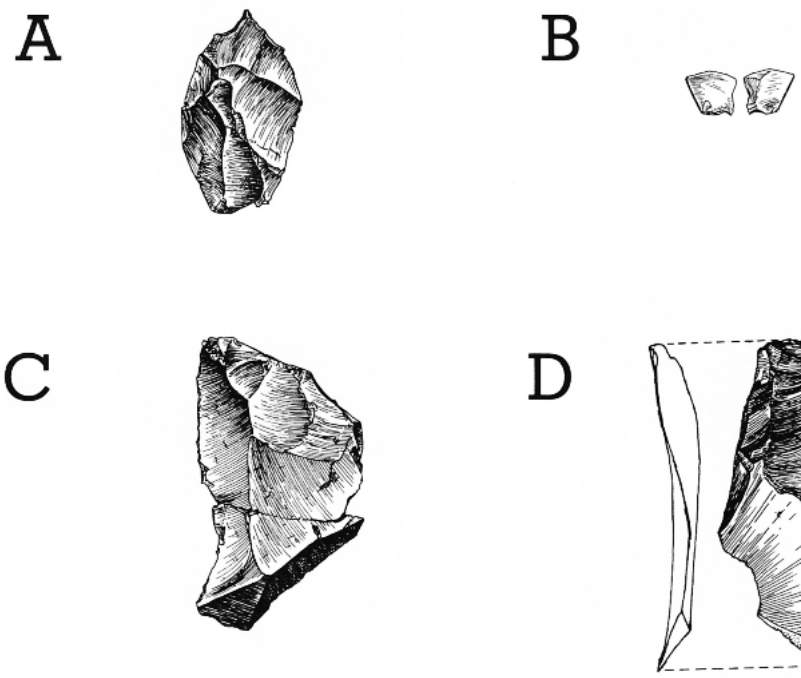


B



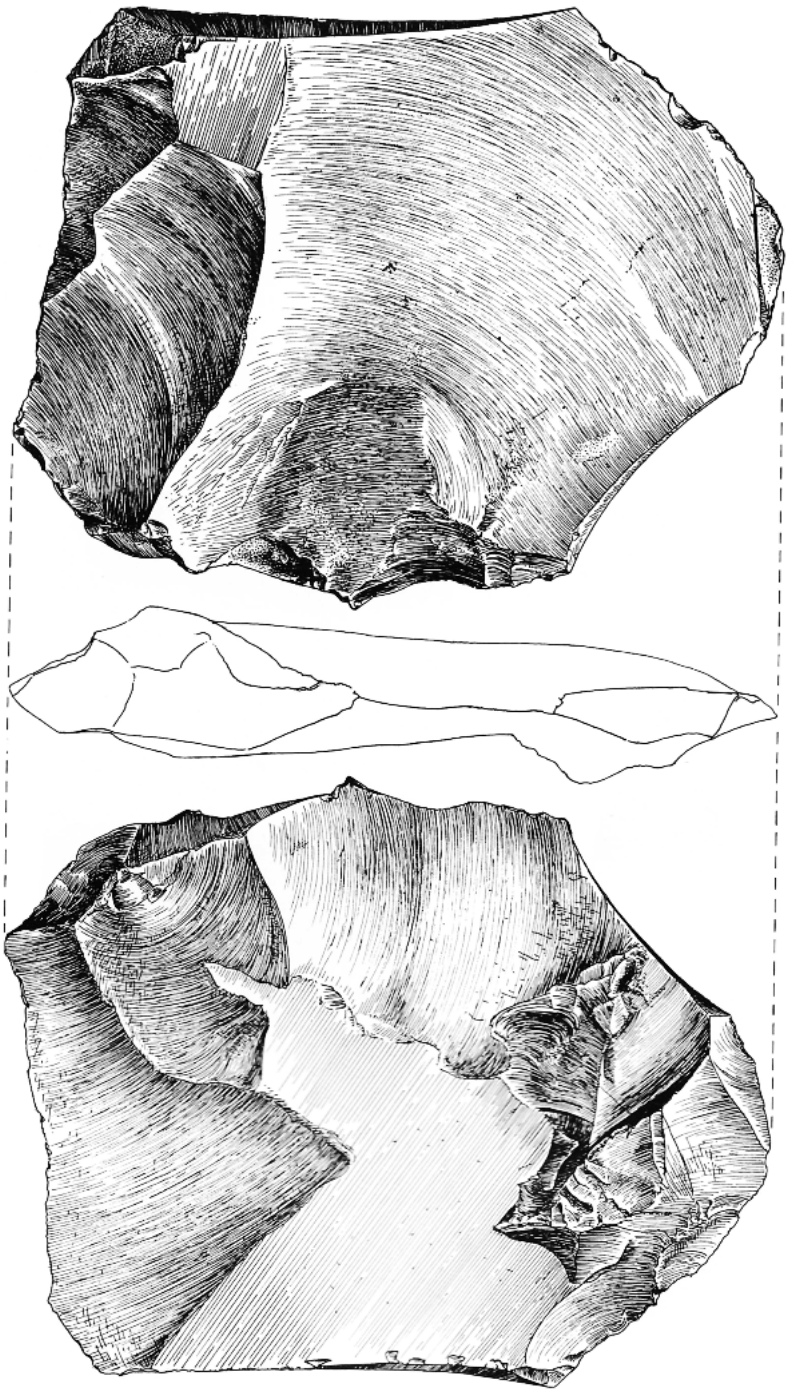
A, fluted adze or celt, variegated agate (red-brown, light gray, tan), length 133 mm; ***B***, celt or adze with damage to one corner of the bit, reddish brown agate with orange-white band, length 132 mm. Two-thirds actual size.

A is available as a cast from Lithic Casting Lab, Troy, Illinois 62294.

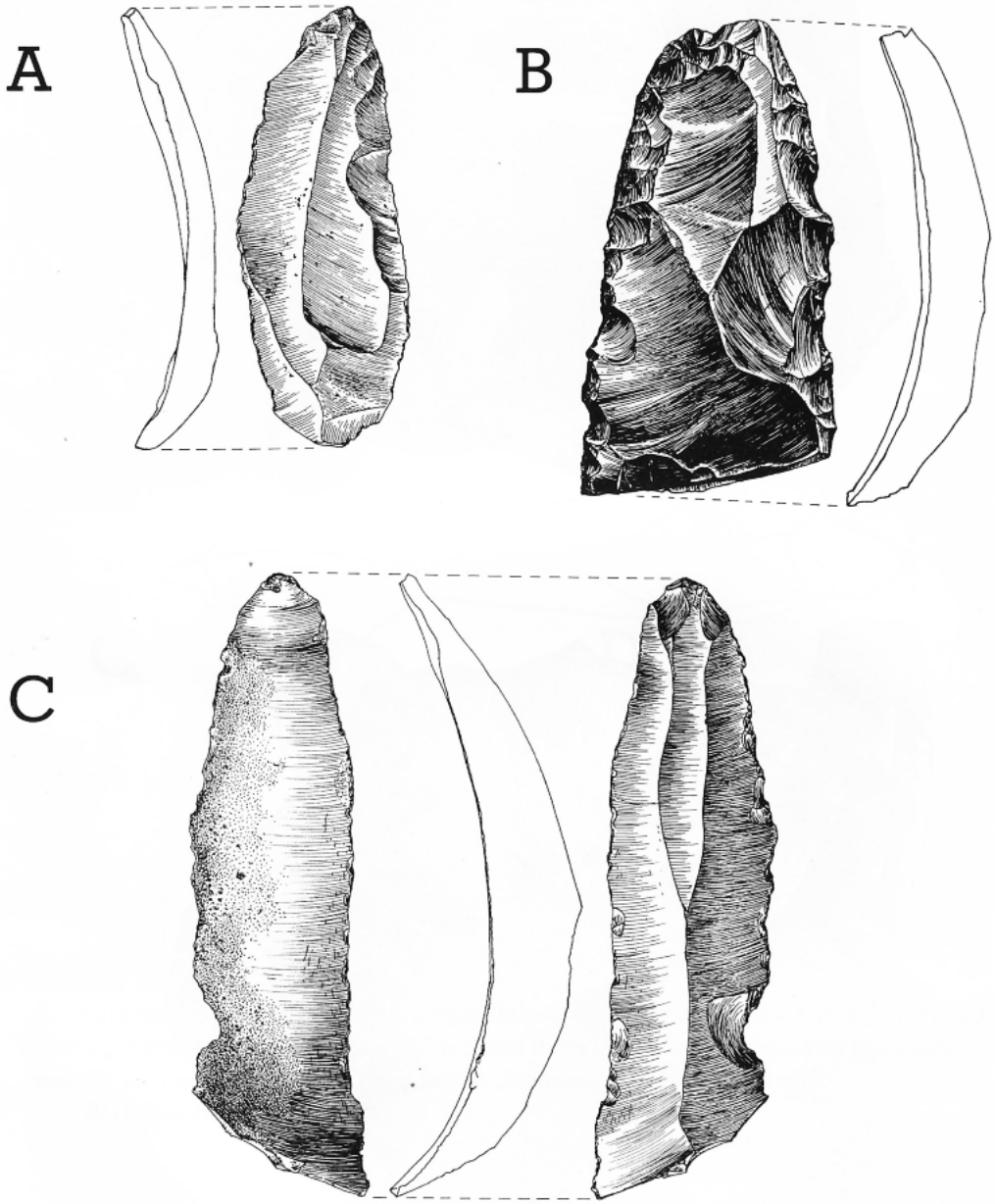


A, engraving tool (graver) with a single flaked spur, grayish-white agate, length 39 mm; ***B***, micro-graver of gray-white agate; ***C***, utilized flake (flake knife) of grayish red agate, length 55 mm; ***D***, utilized flake-blade (flake knife) of carnelian, length 60.0 mm.

All two-thirds actual size.

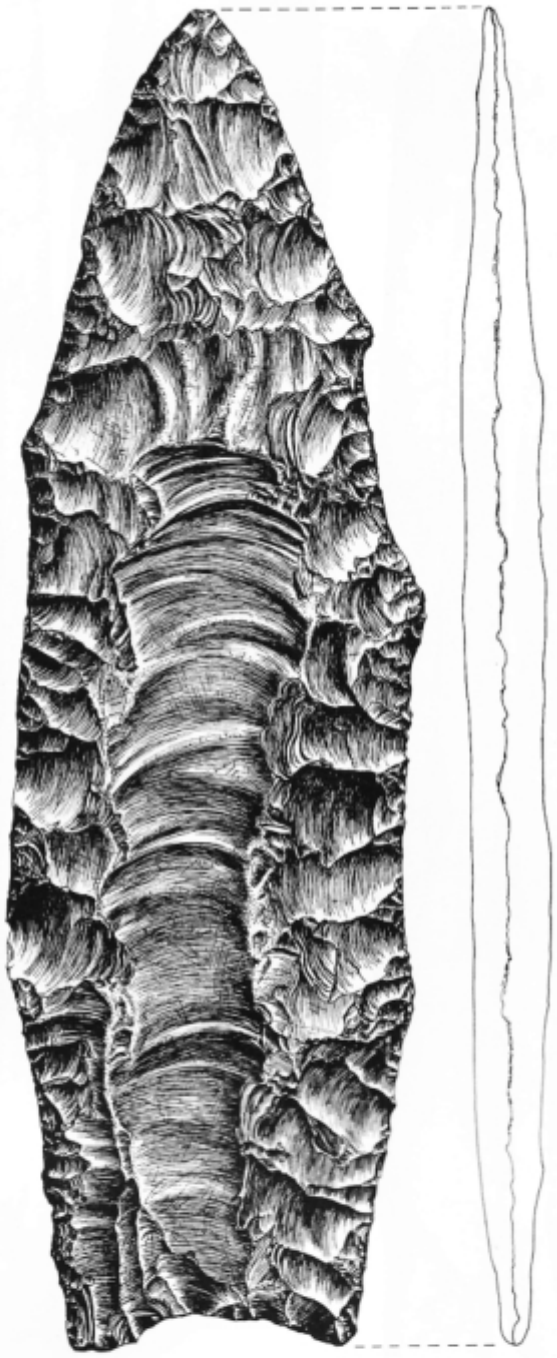


Blank or slab of agate useful for making a variety of tools. Colors are brown, light gray and orange-white. Length 147 mm, width 135 mm, thickness 25.8 mm, weight 428.2 gr. Traces of ancient blood residue under small flakes along the edge suggest that this artifact may have been used for chopping and dismemberment. Two-thirds actual size.

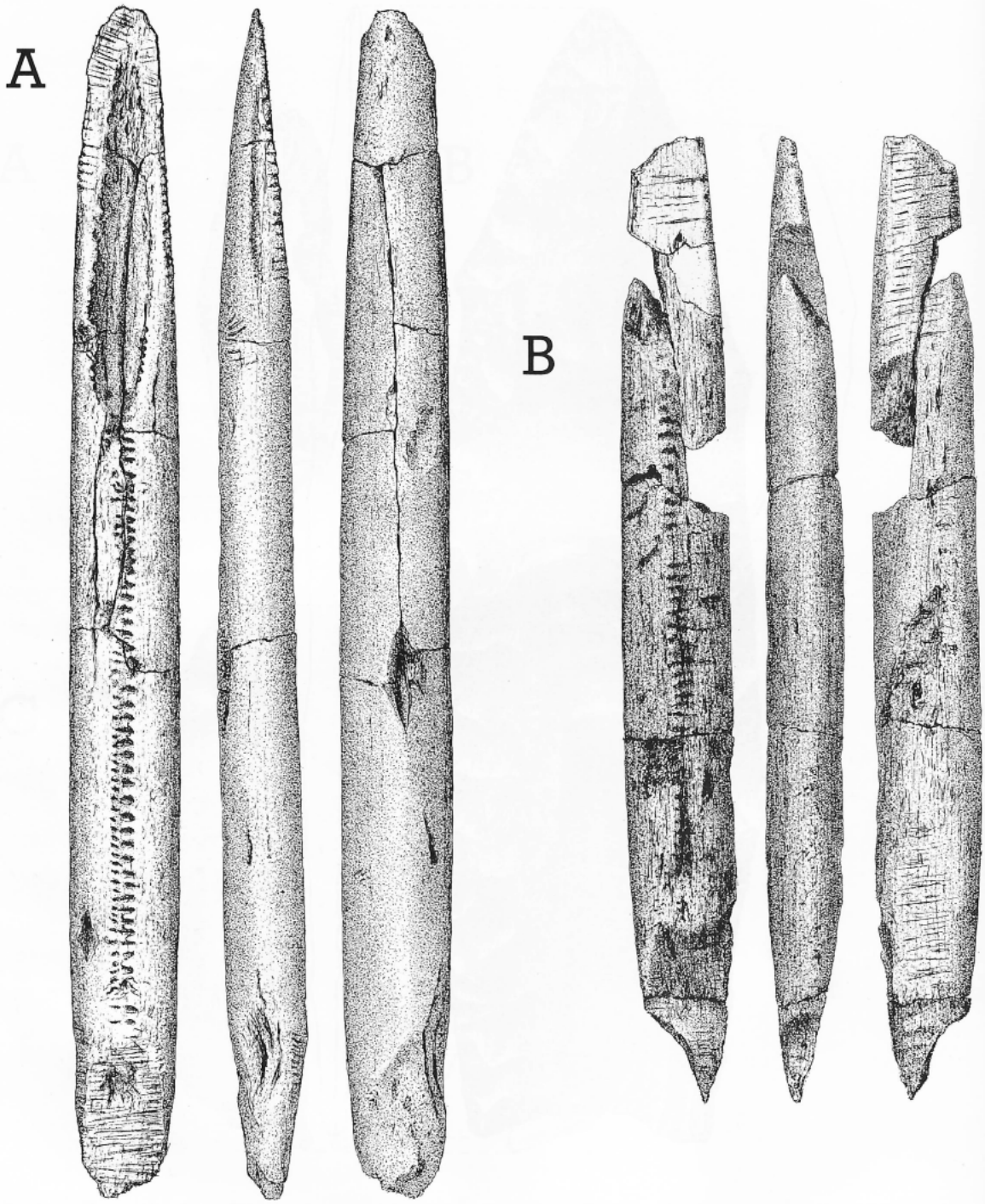


Artifacts from the East Wenatchee site but not part of the Richey Clovis Cache. ***A***, utilized prismatic blade of red-brown and honey agate, length 85 mm; ***B***, sidescraper from Feature 2, variegated agate (red-brown and honey), length 107.0 mm; ***C***, utilized prismatic blade from Feature 2, honey agate, length 121.5 mm. All two-thirds actual size.

B is available as a cast from Lithic Casting Lab, Troy, Illinois 62294.

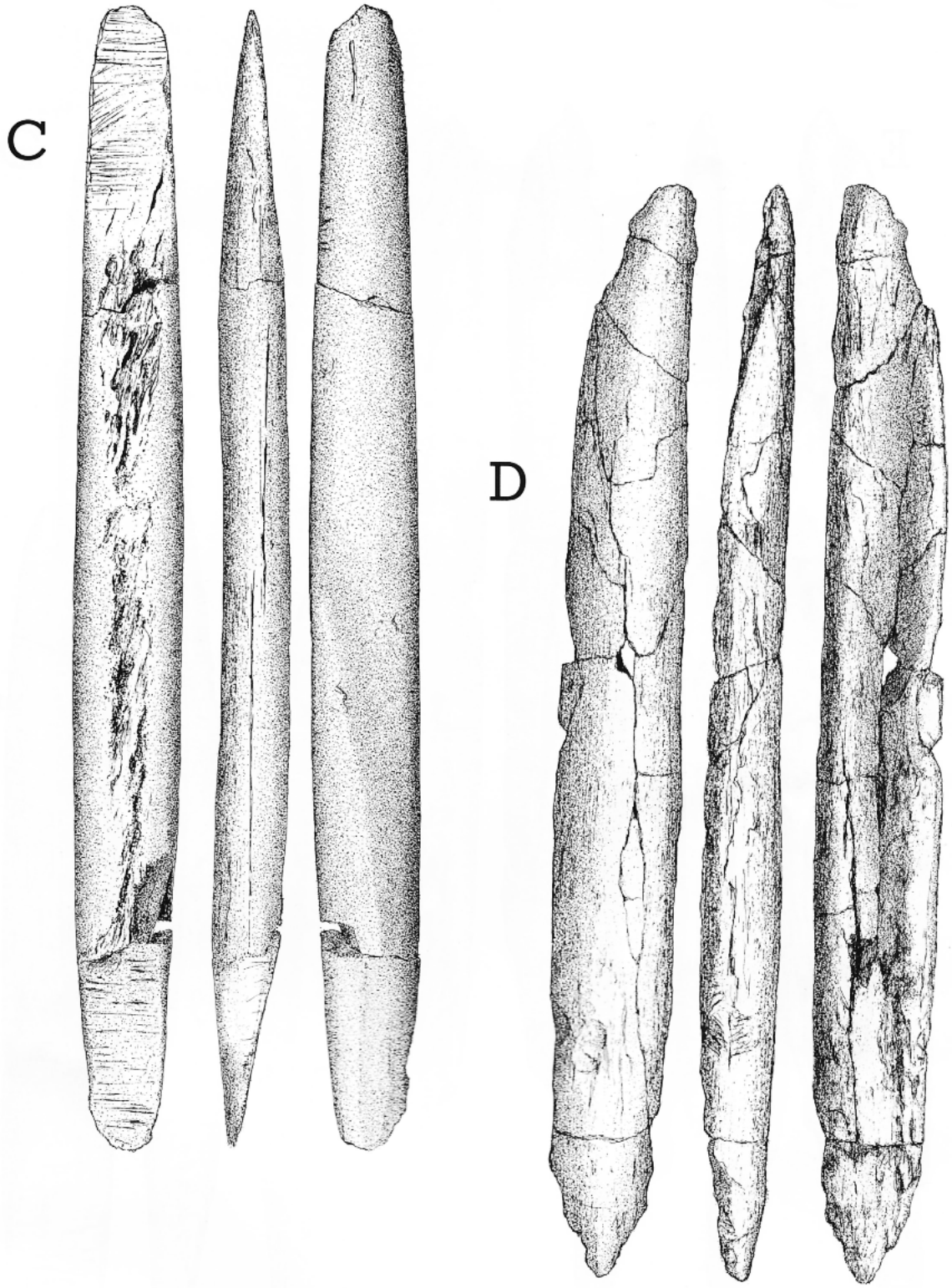


Largest fluted point (knife) known to science. Discovered in a wheat field on Badger Mountain approximately 12 km NNW of the East Wenatchee Clovis site. The knife is heavily resharpened and may have been longer when first made. Raw material is green-sheen obsidian from the Great Basin. Length 247.0 mm, width 74.8 mm, thickness 13.0 mm. Two-thirds actual size.



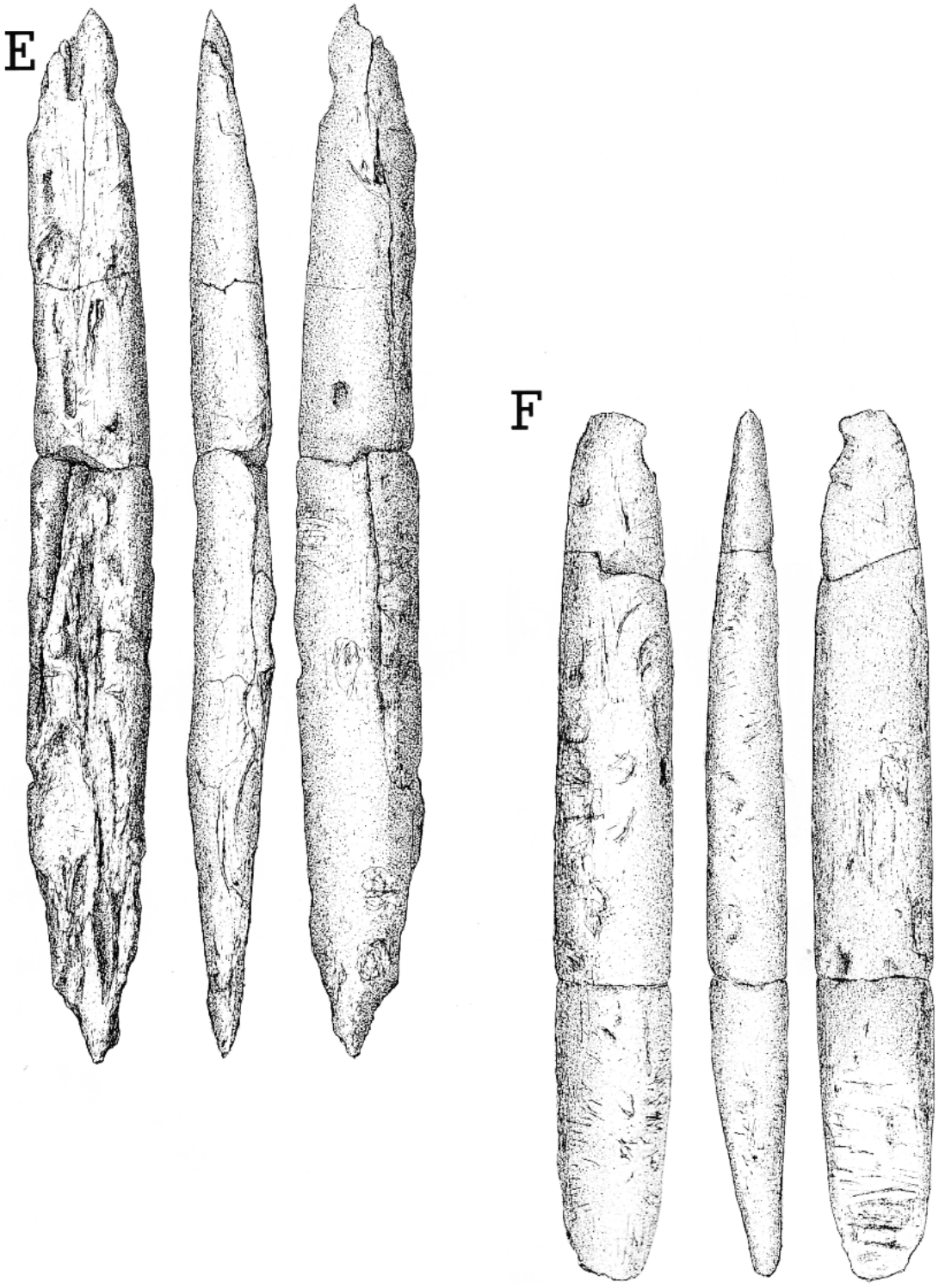
Bi-beveled rods of proboscidean limb bone from the Richey Clovis Cache. Note the incised decorations (ramiforms) along the main axis of both rods as well as the fine scoring around the beveled ends. ***A*** has an end gnawed away; while ***B*** has suffered modern damage and pieces have been lost. Two-thirds actual size.

A is available as a cast from Lithic Casting Lab, Troy, Illinois 62294.

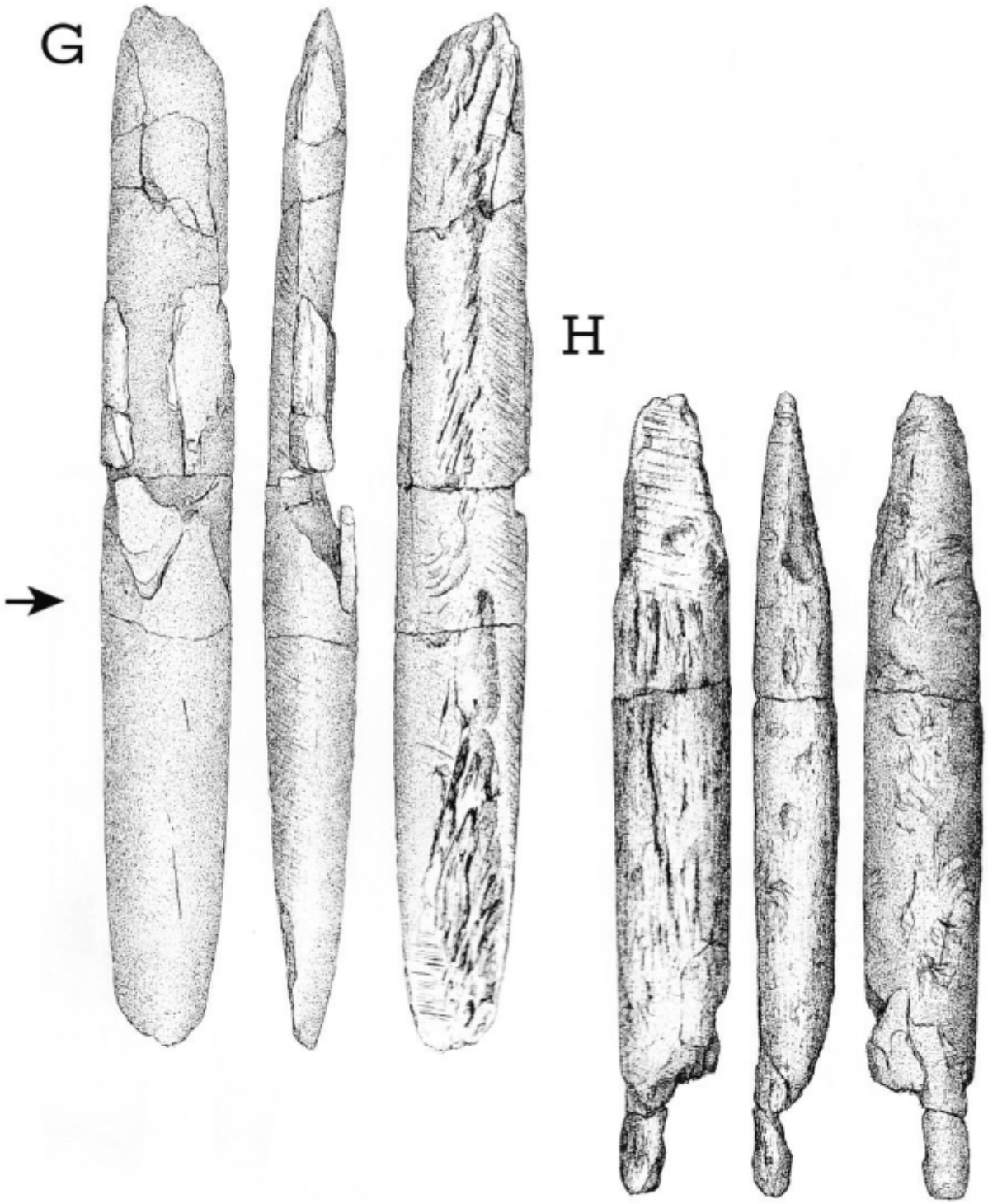


Bi-beveled rods of proboscidean limb bone from the Richey Clovis Cache. ***C*** is the best preserved specimen of the 14, and finely scored lines are evident around the bevels; ***D*** has undergone gnawing, pressure-cracking and general dissolution – perhaps hastened by irrigation and other orcharding activities. ***C*** may be better preserved as it lay partly underneath and was protected by a large stone blank (plan view, specimen 53). Two-thirds actual size.

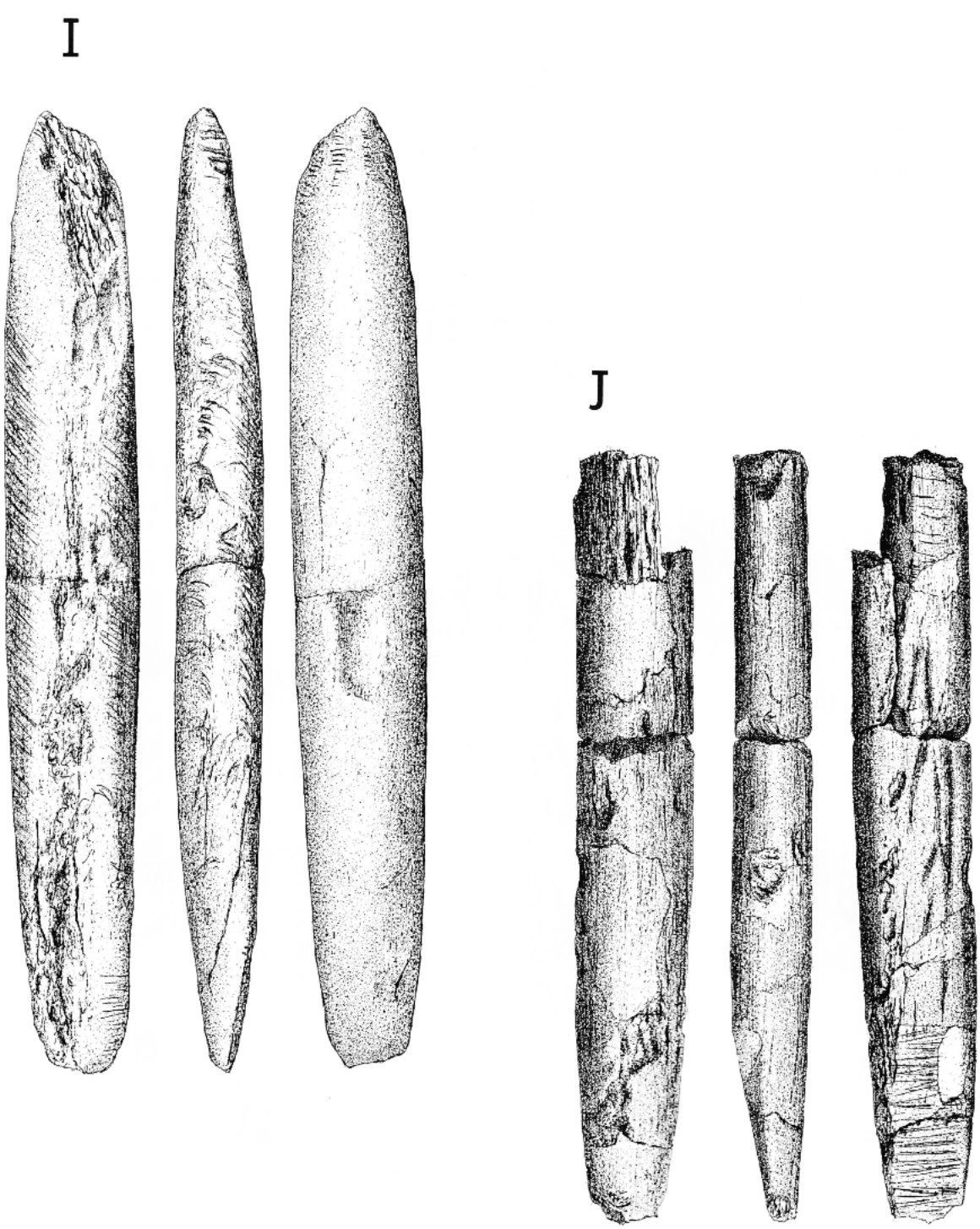
C is available as a cast from Lithic Casting Lab, Troy, Illinois 62294.



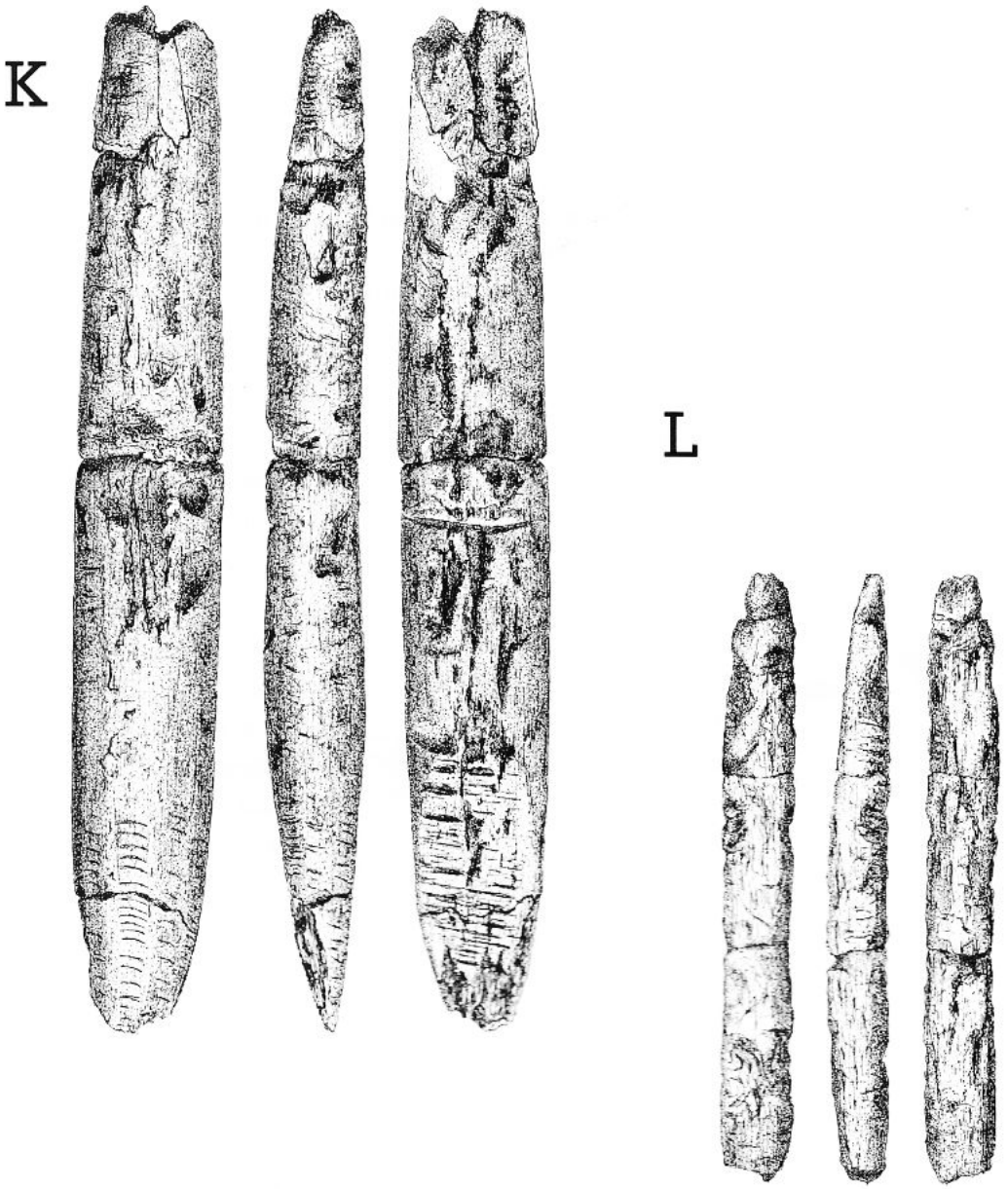
Bi-beveled rods of proboscidean limb bone, Richey Clovis Cache. ***E*** is badly gnawed and shows tooth pit-marks; note finely scored lines around bevels on ***F***. Two-thirds actual size.



Bi-beveled rods of proboscidean limb bone, Richey Clovis Cache. ***G***, which has suffered heavy gnawing and bone loss, furnished a 6-gram sample of bone powder from faces of a recent fracture (arrow) for radiocarbon-dating. One end of ***H*** has been completely gnawed away. Note also numerous tooth scratch-marks and shallow pitting. Two-thirds actual size.



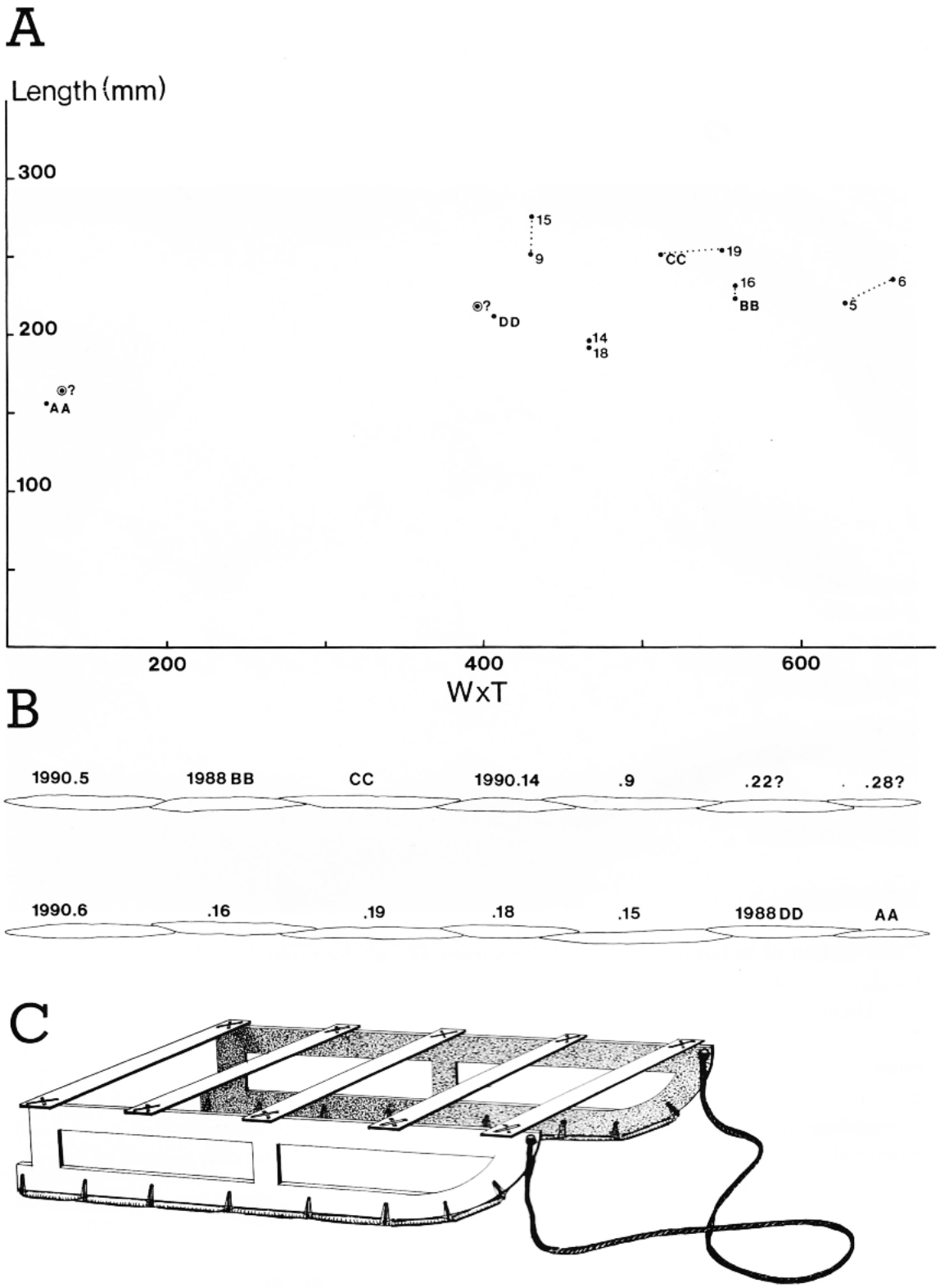
Bi-beveled rods of proboscidean limb bone, Richey Clovis Cache. *I*, is very massive and thick; *J*, has suffered extensive modern damage and loss. Two-thirds actual size.



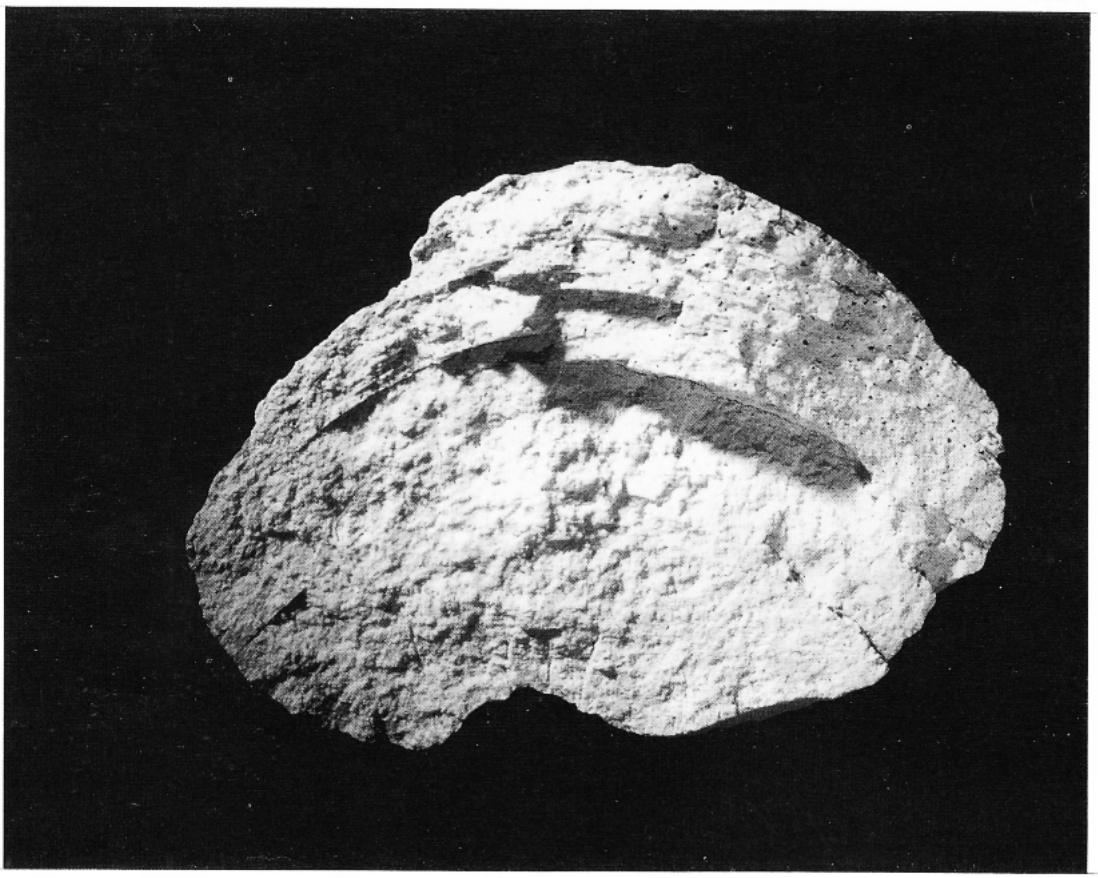
Bi-beveled rods of proboscidean limb bone, Richey Clovis Cache. ***K*** has suffered both modern damage and loss as well as ancient gnawing (note many tooth pit-marks); ***L***, the smallest rod among the 13 intact specimens, has lost an end to gnawing. The same scavenger (a wolverine?) may have completely consumed a companion rod to ***L***. Two-thirds actual size.

Attributes of bi-beveled bone rods from the Richey Clovis Cache.
Measurements in centimeters and grams.

Specimen	Length	Width	Thickness	Weight	Remarks
A	26.3	2.4	1.8	75.1	decorated
B	20.9	2.4	1.7	52.8	decorated, recent damage
C	25.2	2.4	1.8	69.2	well-preserved
D	24.2	2.9	1.9	62.0	badly gnawed
E	23.1	2.8	2.0	58.9	gnawed heavily
F	19.0	2.6	1.8	49.7	
G	23.2	3.0	2.2	83.6	sections missing
H	17.7	2.6	1.8	44.2	end gnawed away
I	21.5	3.0	2.1	89.7	massive
J	17.1	2.7	1.9	59.7	recent damage
K	19.3	2.8	2.0	66.2	recent damage
L	11.5	1.3	1.2	9.9	severely gnawed
M	Hundreds of small bone fragments unearthed in the soil block — perhaps the excreta of a scavenger (wolverine?) — represent another small bi-beveled rod similar in size to L.				
N	Bi-beveled bone rod of undetermined size and weight (but perhaps matches B) remains *in situ*. See plan view, #45.				



A, plot of the modulus, width times thickness, *vs.* length for the 12 bi-beveled bone rods from the Richey Clovis Cache; pairing is clearly evident. ***B***, suggested arrangement of bi-beveled rods into arrays of seven. Field catalogue numbers are given. ***C***, artist's reconstruction of Clovis sled with bi-beveled bone rods serving as shoes for the runners. The dimensions of the sled have been figured at 1.5 m (length), 1.0 m (width), and 25 cm (height).



Cross-section of bi-beveled bone rod (Specimen *G*), photographed at 3X. Note concentric tabular structure and many fine pores of varying size.

Using clean tools a sample of bone was tunneled out from this face and submitted to Beta Analytic, Inc. for radiocarbon dating by the method of tandem linear accelerator mass spectroscopy. The result after extended counting time and an adjustment for isotope fractionation was 5,215±90 years BP (Beta-43663, ETH-7827). Clearly, this result is not acceptable for a Clovis assemblage and may indicate that the bone has been thoroughly contaminated by orchard chemicals. Dating of amino acids in the collagen fraction may be the only method of directly dating artifacts in the Richey Clovis Cache without harming them.

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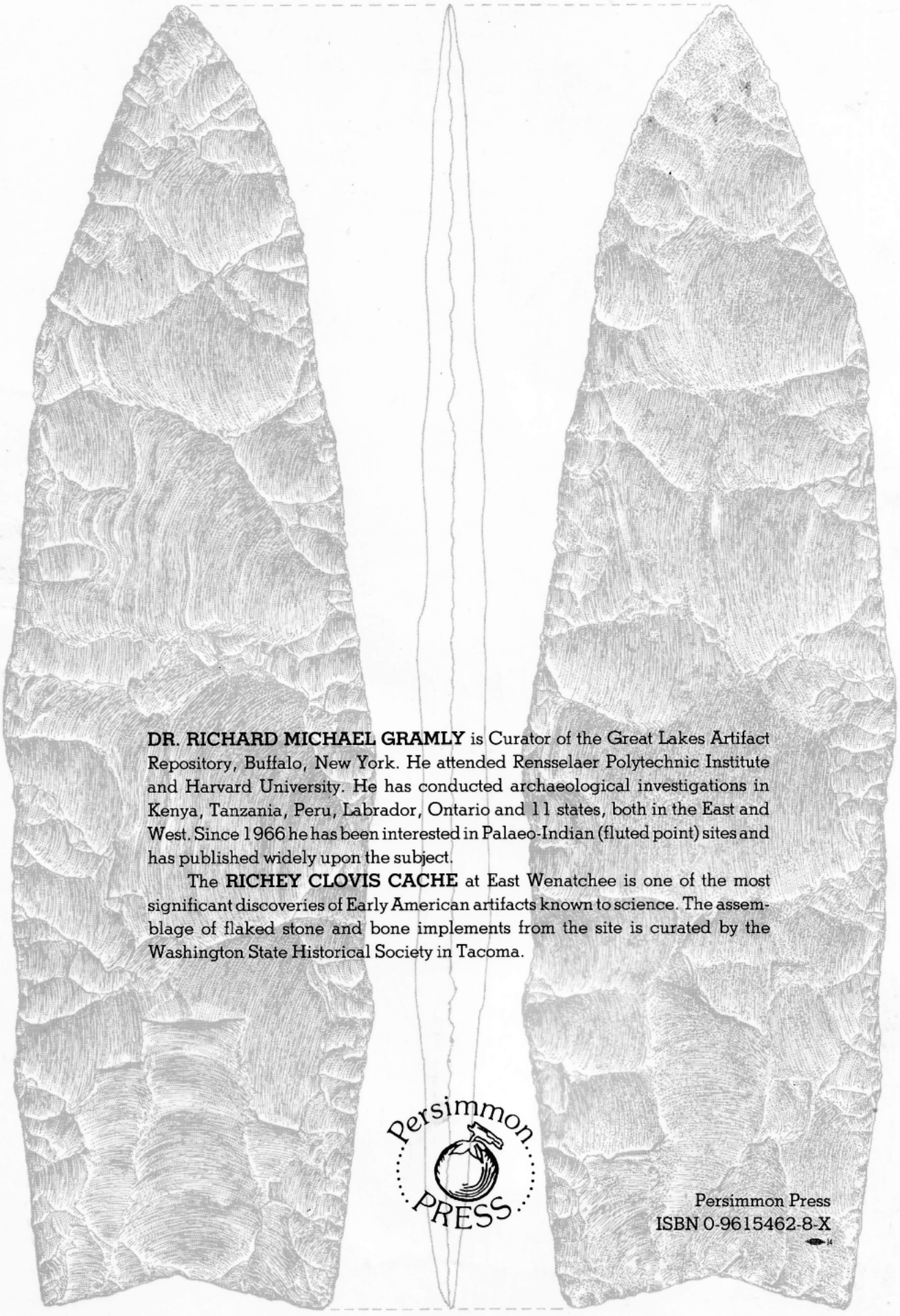

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The **RICHEY CLOVIS CACHE** at East Wenatchee is one of the most significant discoveries of Early American artifacts known to science. The assemblage of flaked stone and bone implements from the site is curated by the Washington State Historical Society in Tacoma.

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